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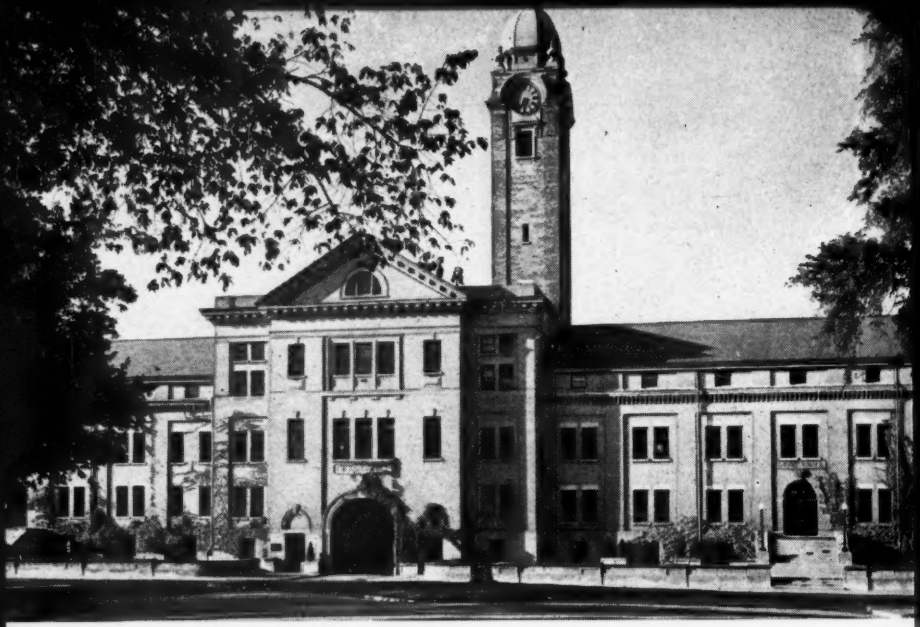

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The Marshall Islands Operation

Vice Admiral Harry W. Hill, *United States Navy*
Commandant, National War College

Due to space limitation, this article is published in two parts. The second part covering the capture of Eniwetok Island will be published in the February issue of the MILITARY REVIEW.—The Editor.

THE successful assault on the Marshall Islands was one of the most important operations of the Central Pacific Campaign, which had been initiated in November 1943 with the capture of the Gilbert Islands. The Marshall Islands operation pierced the outer fringe of the highly fortified Japanese Central Pacific position. This breakthrough penetrated to a depth of 700 miles, the equivalent of the distance from the Normandy Beaches to Munich.

Strategic Background

On 20 July 1943 at the same time that the Joint Chiefs of Staff directed CinCPac to undertake the Gilbert operations, they also had directed him to undertake the preparation of plans for the seizure of the Marshalls with a target date of 1 January 1944.

CinCPac was assigned the following tasks.

(a) To organize and train the forces assigned.

(b) To secure control of the Marshall Islands, by capturing, occupying, defending and developing bases therein.

(c) Upon completion or during accomplishment of task (b) to seize or control Wake, Eniwetok and Kusaie.

The preliminary purpose of these operations was to prepare to gain control of the Caroline Islands. The troops made available for the Marshalls campaign were the 7th Infantry Division, then in Hawaii; the 4th Marine Division, in California; the 106th Infantry Regiment, and the 22d Marine Regiment, both in Hawaii.

Preliminary studies soon indicated that because of lack of training time for the troops, the time for overhaul and reloading of the shipping utilized for the Gilbert operations, and also the probable late date of readiness of the air fields being constructed on the atolls seized during the Gilbert operations, the 1 January date could not be met. Therefore, on 15 October, CinCPac recommended a postponement to 31 January 1944.

Although the troops concerned had been alerted in August to the possible objectives for assault, the actual decision regarding the points of attack was not made until after the completion of the Gilbert operations, and the responsible leaders had had a chance to consult regarding the lessons learned from that operation.

You will note (Figure 1) the eastern portion of the Marshall Islands, known as the Ratak Chain, contained three heavily fortified Jap atolls (Wotje, Maloelap, and Mille) with excellent air fields, and at Wotje, a submarine base. About

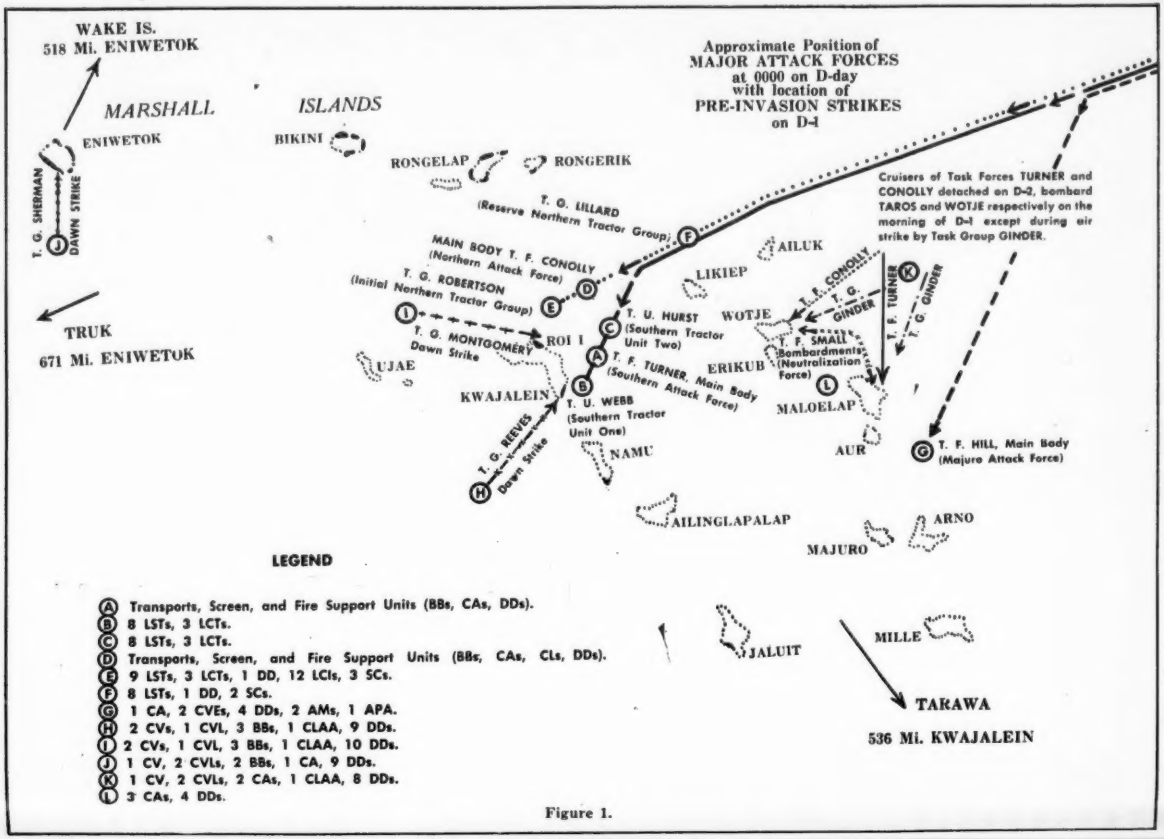

WAKE IS.
518 Mi. ENIWETOK
MARSHALL ISLANDS
ENIWETOK
BIKINI
RONGELAP
RONGERIK
T. G. SHERMAN
DAWN STRIKE
TRUK
671 Mi. ENIWETOK
Approximate Position of MAJOR ATTACK FORCES at 0000 on D-day with location of PRE-INVASION STRIKES on D-1
Cruisers of Task Forces TURNER and CONOLLY detached on D-2, bombard TAROS and WOTJE respectively on the morning of D-1 except during air strike by Task Group GINDER.
T. G. LILLARD (Reserve Northern Tractor Group)
MAIN BODY T. F. CONOLLY (Northern Attack Force)
T. G. ROBERTSON (Initial Northern Tractor Group)
T. G. MONTGOMERY Dawn Strike
T. U. HURST (Southern Tractor Unit Two)
T. F. TURNER, Main Body (Southern Attack Force)
T. U. WEBB (Southern Tractor Unit One)
T. G. REEVES Dawn Strike
AILUK
LIKIEP
WOTJE
T. F. CONOLLY
T. G. GINDER
T. F. TURNER
T. G. GINDER
T. F. SMALL Bombardments (Neutralization Force)
ERIKUB
MALOELAP
AUR
T. F. HILL, Main Body (Majuro Attack Force)
ROI I
UJAE
KWAJALEIN
NAMU
AILINGLAPALAP
MAJURO
ARNO
JALUIT
MILLE
TARAWA
536 Mi. KWAJALEIN
LEGEND
A Transports, Screen, and Fire Support Units (BBs, CAs, DDs).
B 8 LSTs, 3 LCTs.
C 8 LSTs, 3 LCTs.
D Transports, Screen, and Fire Support Units (BBs, CAs, CLs, DDs).
E 9 LSTs, 3 LCTs, 1 DD, 12 LCIs, 3 SCs.
F 8 LSTs, 1 DD, 2 SCs.
G 1 CA, 2 CVEs, 4 DDs, 2 AMs, 1 APA.
H 2 CVs, 1 CVL, 3 BBs, 1 CLAA, 9 DDs.
I 2 CVs, 1 CVL, 3 BBs, 1 CLAA, 10 DDs.
J 1 CV, 2 CVLs, 2 BBs, 1 CA, 9 DDs.
K 1 CV, 2 CVLs, 2 CAs, 1 CLAA, 8 DDs.
L 3 CAs, 4 DDs.

Figure 1.

200 miles west of these islands was the Ralik chain of islands containing the island of Jaluit at the southern extremity, with an excellent air field and naval base facilities, and also the large atoll of Kwajalein. At somewhat greater distance (not shown in Figure 1), stretching from north to south in a wide arc to the westward were Wake Island, with a submarine and air base; Eniwetok Atoll (Engebi Island) with an air base which was particularly important as a staging base for air and surface craft between Truk and Wake and the other Marshall bases; and Nauru Island with a search plane (land) base. Westward of this arc of islands, as a connecting link between Truk and the Japanese homeland, lay Ponape.

Intelligence reports indicated that the Japanese, since the assault on the Gilberts, had been making a frantic effort to speed up the reinforcement of defenses in these islands, particularly in the three outer islands of Wotje, Maloelap and Mille. The question confronting Admiral Nimitz was: Should the first attack be made on two of the outer bases, or should he adopt the unorthodox and bold procedure of bypassing these outer bases, striking directly and with full strength at Kwajalein? It was a difficult and most important decision which had to be made. I was present at the final conference at which all the pros and cons were discussed and weighed, and I shall never forget my thrill of admiration when Admiral Nimitz, in a quiet voice, made his decision, "We will go to Kwajalein."

The Gilbert operations had given him a great degree of confidence in the ability of carrier forces to destroy the effectiveness of these outer Jap bases and subsequent events proved this decision one of the most important ones of the Central Pacific Campaign.

General Plan

The general plan of the operation was to capture three key points; Roi and Kwajalein Islands, about forty-five miles apart in the Kwajalein Atoll, which were believed to be the key defense points of the Marshalls, and the lightly defended Majuro Atoll, 250 miles to the southeast; and to establish air and naval bases at these three points from which to exercise domination of the rest of the Marshall group and to provide facilities for the attack on Japanese islands further to the westward. This three-prong attack dictated the organization of the forces involved and the assignment of the tasks. The first essential to the execution of this plan was to guard against a possible attempt by the Japanese Fleet, or units thereof, to interfere with it. For this purpose the main combatant strength of the U.S. Pacific Fleet—fast battleships, carriers, cruisers, and destroyers—were to be interposed as a covering force with the title of "Carrier Force"—a force later to become famous as Task Force 58.

Since the three main objectives were surrounded by enemy air and naval bases within easy supporting range, and since a large number of transports and supply vessels necessarily concentrated and partially immobilized at the points of assault would present highly vulnerable targets to Japanese air attack, the early neutralization and denial of these enemy bases was essential to the success of the operation.

The Japanese bases from which air attack might be expected were located at Ponape, Eniwetok, Wake, Roi, Kwajalein, Wotje, Mille, Kusaie, Nauru and Jaluit.

This neutralization plan consisted broadly in bombing of the above named objectives carried out through the several preceding weeks by the land-based aircraft with progressively increasing intensity up to D-day and continuing thereafter as necessary. The land-based aircraft coverage was to be augmented on

Figure 1.

D—2 by the carrier aircraft of the Carrier Force, and by the guns of a "Neutralization Group" of heavy cruisers; increased on D—1 by bombardments from the battleships, cruisers and destroyers of both the Carrier Force and the Joint Expeditionary Force; and continued by all of them as found necessary thereafter.

In addition to the neutralization of neighboring enemy air bases and the prevention of interference from the direction of Truk and the Japanese home islands, the following are some of the typical additional tasks incident to the actual landing of troops at each objective:

(a) Transportation of troops from the home bases to objectives.

(b) Protection of all shipping, both en route and while at the objectives.

(c) Softening up of the island objectives by surface and air bombardment.

(d) Demolition of underwater beach obstacles and defenses.

(e) Close support of the assault troops by continuous bombardments and bombings as required.

(f) Mine sweeping, surveying and buoying of the atolls, as required to make navigation safe for our vessels.

Bearing in mind the foregoing rough summary of typical tasks that had to be done, the number of places involved, and the types of forces available to do these tasks, it should be easy to understand the overall organization, the different echelons of command and the specific tasks assigned to forces, groups, and units.

Organization and Command

Supreme command of the operation under the Commander in Chief, U.S. Pacific Fleet, was vested in Vice Admiral Spruance, Commander of the Central Pacific Forces and of the forces engaged in this operation. The "Defense and Land Based Aircraft," based in the newly acquired Gilbert Islands to the southeast, were under the command of Rear Admiral Hoover. The "Carrier Force," which was to cover the whole operation against interruption by the Japanese Fleet and provide part of the neutralization, was under the command of Rear Admiral Mitscher. It in turn was broken down into four groups under command of Admirals Reeves, Montgomery, Sherman, and Ginder. As a neutralization measure additional to the air strikes by the defense and land-based aircraft, the "Neutralization Group" under Rear Admiral Small, consisting of a small number of cruisers, destroyers, mine layers, and, later, two escort carriers, was to bombard and lay mines at Wotje and Taroa. The actual attacks, landings and seizure of all three objectives were carried out by the Joint Expeditionary Force, under command of Rear Admiral Turner. This force comprised not only the transports, troops and cargo carriers, but also the slow battleships, escort carriers, cruisers, destroyers, etc., needed for the protection of the Joint Expeditionary Force en route to and at the objective, and for support of the landings. The troops within the Joint Expeditionary Force were under the command of Major General Holland Smith, U.S.M.C. The Joint Expeditionary Force was broken down into other groups and task forces to carry out specific tasks. The principal ones of these were the Northern Attack Force commanded by Rear Admiral Conolly, the Southern Attack Force commanded by Rear Admiral Turner, and the Majuro Attack Group commanded by Rear Admiral Hill.

Preliminary Covering and Neutralization Operations

The defense and land-based aircraft from the Gilbert Islands, commencing on 1 January, began attacks on Mille, Wotje, Maloelap, Kwajalein, Wake, Nauru, and Kusaie. These attacks were stepped up in intensity until D-day.

On 1 January our total air strength operating from the new bases in the Gilberts, Tarawa, Makin, and Apamama, was 125 aircraft of all types. By the end of

the month this total had been increased to 365, organized as follows:

1. An Army bombing group consisting of 137 B-24s, B-25s, and A-24s.

2. A fighter group of 130 P-39s, P-40s, and F6Fs.

3. A search and patrol group composed of 98 PBYs, PBMs, PB4Ys and PVs.

It is significant to note that during this period, the number of Japanese planes staged into Truk had increased the totals at that place to several hundred, but the continued bombing of these outer bases prevented the staging of those planes to them for their local defense.

By the morning of 29 January (D—2), the Carrier Force, divided into four task groups, had reached their positions undetected, and at dawn of that date launched their all-out air strike. In spite of the distances between various objectives to be attacked (during D—1 and later days) all task groups were deployed within a reasonable radius of Kwajalein Atoll, so as to permit prompt concentration in the event of the approach of a major enemy surface force or heavy air attack. One group hit Wotje, a second group took care of Taroa, and the other two groups blasted the landing objectives of Roi-Namur and Kwajalein-Ebeye Islands. The Carrier Force had available over 700 carrier aircraft for these attacks on an estimated 160 enemy aircraft and four bases.

The carrier group which had attacked Kwajalein-Ebeye Islands on D—2 moved northwest during the night, and took a position from which to launch an attack on Eniwetok Atoll at dawn on D—1, being relieved at Kwajalein by the group which had attacked Taroa on D—2. The group that had been attacking Wotje took over operations against Taroa as an additional task.

During the afternoon and night of D—2, and on D—1, in addition to air attacks at Roi-Namur and Kwajalein Islands, the battleships and cruisers of two Carrier Groups bombarded selected targets on these islands. At Wotje and Taroa, operating in conjunction with the air attack, the "Neutralization Group" conducted a heavy bombardment on a twenty-four hour basis, which was continued until 11 February (D+11).

On D-day two of the carrier groups remained in position to provide direct air support of the ground forces, while the other two groups continued to attack Eniwetok, Wotje and Taroa.

The submarine forces involved in the operation kept clear of the immediate operating area but rendered valuable support by patrolling at selected points, with the general task of rescuing downed aviators, to give warning of approaching enemy forces, to intercept and attack any such enemy forces, to furnish weather reports, and to carry out such other operations as ordered.

Assembly and Movement of the Joint Expeditionary Force

Ships, troops and other units making up the Joint Expeditionary Force were initially located in the Hawaiian Islands and on the west coast of the U.S. The assembly of forces began in late December 1943, and the first unit to get under way, the Northern Tractor Group, departed San Diego on 6 January 1944.

The 4th Marine Division and attached units conducted rehearsals and were loaded at San Diego and departed on 13 January, stopping at Lahaina Roads for fuel and resupply before further movement to the objective. This reinforced division constituted the landing force for the Northern Attack Force.

The 7th Infantry Division, and attached units, which was the landing force of the Southern Attack Force, was in the Hawaiian Islands. They loaded in early January and left Pearl Harbor on 22 January.

The Force Reserve, consisting of the 106th Infantry Regiment (less one battalion) and the 22d Marine Regiment, loaded in the Hawaiian Islands and left Pearl Harbor on 23 January in company with the Majuro Attack Group. The Majuro Landing Force consisted of the Reconnaissance Company, V Marine Amphibious Corps, and one battalion from the 106th Infantry.

The bombardment and escort vessels and other miscellaneous craft accompanied

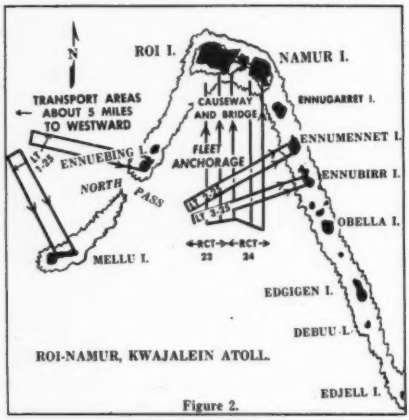


Figure 2.

the force to which they were assigned. Garrison shipping was echeloned to arrive at the objectives at regular intervals.

The movement and approach to the objectives were without incident and the attack forces and group arrived at their specific objectives prior to dawn on 31 January 1944,—D-day.

Bombardment Preparation, all Objectives

The air and naval bombardments of all objectives prior to D-day have already been described. It had been very effective—so effective, in fact, that during the entire period of the assault on these two objectives no enemy planes were encountered. Complete control of the air in that area had been gained.

On the morning of D-day, the slow battleships, light and heavy cruisers, and the destroyers of the Joint Expeditionary Force took up the bombardment of the assault objectives, aided by the land-based aircraft and the aircraft of two groups of the Carrier Force. In addition to the assault objectives, adjacent islands of Kwajalein Atoll were neutralized.

From D-day on, main and secondary objectives were kept under continual air and surface bombardment of varying intensity by both ships and aircraft of the Force. During this bombardment a total of 5,500 tons of projectiles and bombs was expended. The gunfire support required guns of all calibers. Tarawa had taught us that nothing less than a 14-inch projectile had any chance of penetrating the ten-foot thick reinforced concrete walls of a Jap blockhouse. Air support proved particularly successful in taking out defiladed defense points and in giving close support to the advancing troops.

On D-day, the Divisional Artillery of the 4th and 7th Divisions was landed on small islands adjacent to their respective objectives. It registered in and commenced bombardment on the night of D-day, and the following morning supported the main landings in conjunction with the naval and air bombardments.

Northern Attack Force Operations (Figure 2)

The Northern Attack Force, under Rear Admiral Conolly, assigned to the capture of Roi-Namur, was initially organized into Transport Group, Minesweeper Group, Gunfire Support Group, Escort Carrier Group, Tractor Groups (LSTs with amphibious tractors and DUKWs aboard), a Salvage Group, and the Northern Landing Force. The latter consisted of the 4th Marine Division, reinforced, under Major General Schmidt, U.S.M.C.

At 0530 on D-day, initial operations were begun. A landing team from Combat Team 25 assaulted Ennuebing and Mellu Islands on either side of North Pass and had secured them by 1200. The pass to the lagoon being secured, the 2d and 3d landing teams of Combat Team 25 proceeded across the lagoon to capture Ennumennet and Ennubirr Islands, followed at 1820 by an assault against Ennugarret Island. By 2000 all the islands adjacent to Roi and Namur were occupied. Immediately after the occupation of the islands, the Division Artillery was landed and registered in on Roi and Namur.

During the afternoon of D-day troops of Combat Team 23 and 24, which were to make the assault on Roi and Namur the following day, were transferred to the LSTs carrying the LVTs.

On D+1 Combat Teams 23 (on Roi) and 24 (on Namur) landed with two battalions abreast just prior to 1200. These landings followed a heavy pre-assault bombardment by ships, air, and LCI rockets and guns.

Roi was secured, except for mopping up operations, on D+1. On Namur, the opposition and defenses were stronger, so it was not practicable to complete the capture until the following day (D+2).

There still remained the mopping up of all islands of the northern half of the atoll. On 7 February, Burie, the last of some fifty-five such islands, was occupied. Thereafter, attention was given to base development, re-embarking the assault troops when replaced by the Defense and Garrison Forces, and to preparing such elements as were required for the operation against Eniwetok.

Southern Attack Force Operations (Figure 3)

The Southern Attack Force, directly under Rear Admiral Turner, was organized into the Channel Island Transport Group, Advance Transport Unit, Southern Transport Group, Control Group, Transport Screen, Fire Support Group, Escort Carrier Support Group, Minesweeping and Hydrographic Group, Salvage Unit, and the Southern Landing Force. The latter consisted of the 7th Infantry Division plus attached units commanded by Major General Corlett, USA. The successive tasks or phases assigned the Southern Attack Force were as follows:

(a) Before dawn on D-day, 31 January, to seize the small and supposedly lightly

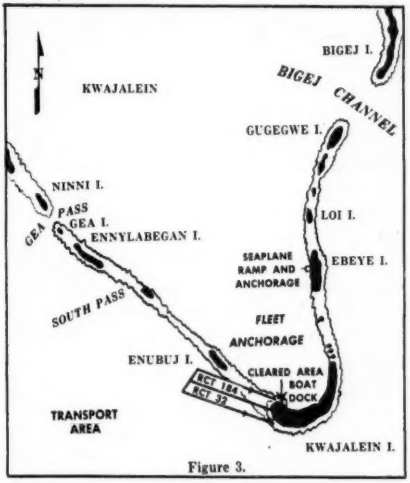


Figure 3.

defended islands of Gea and Ninni on each side of Gea Pass, then to sweep the pass and the achorage area inside for mines and obstacles so that ships of all sizes could enter.

(b) Early on the same day to seize Enubuj Island and Ennylabegan Island about two and seven miles distant, respectively, from Kwajalein Island along the reef to the northwest and to mount on Enubuj 105-mm and 155-mm batteries of the 7th Division Artillery which could then readily lay a barrage of pre-arranged fires anywhere on Kwajalein Island, the heavily defended main objective.

(c) On D+1, to take Kwajalein Island by assault, attacking at the southwestern end of the island from the seaward.

(d) On subsequent days to capture the various islands lying north and northeast along the reef from Kwajalein Island, some of which were defended, though not so heavily as the latter. The principal one of these was Ebeye.

Before dawn on D-day, 31 January, the Channel Island Transport Group landed the 2d Platoons of the 7th Reconnaissance Troop and Company B, 111th Infantry, in rubber boats on Gea Island, and landed the 1st Platoons of the same units on what they took to be Ninni Island. Gea Island was reported secured by 1100 against light opposition. Meanwhile, at daylight the other detachment found they had landed on the wrong island. Gehh instead of Ninni, and were engaging about 130 Japanese armed with machine guns and rifles, who had come ashore from a small vessel beached on Gehh. With some difficulty our troops broke off this action on Gehh, and at 1130 were landed on Ninni, their intended objective, which was secured without resistance. A short time later, due to enemy fire from Gehh, the troops returned and completed its capture. With the islands on both sides of Gea Pass thus secured the minesweeper group proceeded to sweep as planned, and by 1500 the pass and some anchorage areas inside the lagoon were reported clear and ready for the entrance of certain of the transports. The somewhat greater tasks of taking Ennylabegan and Enubuj commenced at 0910 against light opposition. Both islands were secured by 1130 and the landing of division artillery was commenced.

About 1100 on D-day, at high tide and under the highly effective covering fire from the *Mississippi*, *Pennsylvania*, and three destroyers, a joint reconnaissance unit made a daring close reconnaissance in rubber boats off the reefs and approaches to the landing beaches in the southwestern end of Kwajalein Island. This reconnaissance was repeated again at low tide in the late afternoon in LVTs.

On the night of D-day, the divisional artillery having registered on Kwajalein, certain of the transport divisions moved inside the lagoon and anchored over night. Many of the combatant vessels were assigned to keep up fire against Kwajalein and concentrated on preparation for the major assault the next day. At about 0600 on D+1 Admiral Turner ordered the commander of the Southern Transport Group to take charge and land the landing force. Making the assault were Regimental Combat Teams 184 and 32. At 0900 the first wave of the assault troops crossed the line of departure, and at 0930 they reached the beach, followed in short succession by the other waves. Resistance was initially light and scattered, but became more pronounced as the troops advanced inland. Progress was steady against determined resistance, and the island of Kwajalein was secured on D+4.

While fighting was still in progress on Kwajalein, the occupation of the chain of small islands scattered along the eastern reef of the Atoll was started. Several of these islands were well organized for defense with various numbers of enemy troops while the intervening small islands had on them small armed parties at one time or another. By the morning of 6 February the last island in the southern half of the Atoll had been occupied and the mission of the 7th Division was accomplished.

Kwajalein Atoll Statistics

Enemy Strength and Casualties

	Northern Sector	*Southern Sector*	*Subtotal*
Est. Enemy Strength	3,800	4,800	8,600
Enemy dead	3,472	4,650	8,122
Japanese Prisoners	99	48	147
Korean Prisoners	165	125	290
Total	3,736	4,823	8,559

Own Casualties at Conclusion of Assault Phase

	Northern Sector	*Southern Sector*	*Subtotal*
Killed in Action	129	157	286
Wounded in Action	436	712	1,148
Missing in Action	65	17	82
Total	630	886	1,516

Majuro Attack Group Operations

The Majuro Attack Group, under Rear Admiral Hill, consisted of one crusier, two escort carriers, a destroyer division, three minesweepers, one APA, one APD, and an LST. Embarked in the transports and LST were the 2d Battalion of the 106th Infantry, and the Reconnaissance Company, V Marine Amphibious Corps, plus the Headquarters of Garrison Forces. Assault plans were based on intelligence information that there were 300 to 400 Japanese in the Atoll, probably concentrated on Darrit Island. The Reconnaissance Company was sent ahead on the APD to arrive off the entrance islands at 2100 D—1. The scouts landed without incident, but conflicting reports from the natives indicated the possibility that there were 300 Japanese on one of the islands.

On D-day, the task group entered the lagoon at dawn, led by the minesweepers. Upon confirmation by the scouts from the Reconnaissance Company that there were only four Japanese on the Atoll, all attack plans were cancelled. The Garrison Group was landed, the lagoon swept and surveyed, and on D+2, units of the fleet started to arrive, including a squadron of navy patrol planes.

A nation is only as strong as its people. To ensure national strength there must be adequate military forces, properly equipped to repel any attacks upon our sovereignty, and such forces must be backed up by a well organized civilian population of high morale which can produce all the necessities for carrying on modern warfare. This unity of military and civilian strength will be only as strong as its weakest component, therefore, we must ensure that all parts of this combination are equally strong.

Admiral Chester W. Nimitz

Heavy Bombardment Operations in the South Pacific During 1942

Brigadier General La Verne Saunders, *United States Army* (Ret.)

The exploits of "Blondy" Saunders, who was recently retired as a result of wounds received in action, are well known to those who fought with him and near him in the South Pacific. In this article, General Saunders relates the highlights of some of the operations which took place during the early days of World War II in and around Guadalcanal.—The Editor.

THE importance of initial operations, their planning and execution, are usually forgotten when victory is finally achieved. I believe this is true of the war in the Pacific, particularly of the operations in 1942. The men who participated in the events of those trying days will never forget them.

After war was declared on the Axis nations, it was planned to go all out against Germany and defeat her first. All industrial mobilization, training and production were committed primarily against Germany, and secondarily against Japan. This meant that, unprepared as we were, considering the great amount of time it would take to accomplish the production of equipment and the training of men, the forces in the Pacific would get only a trickle of needed supplies, equipment and personnel. We had to stress one of the Principles of War—*economy of force.*

Our defeat of the Jap task and occupational forces at Midway in June 1942 was decided by the arrival of our three large carriers and their escorts from the battle of the Coral Sea, after refueling at Pearl Harbor. This was a surprise for the Japs, as they did not anticipate carrier opposition. Our carrier forces arrived in position in time, northwest of Midway on the morning of 4 June 1942, to turn the tide of battle.

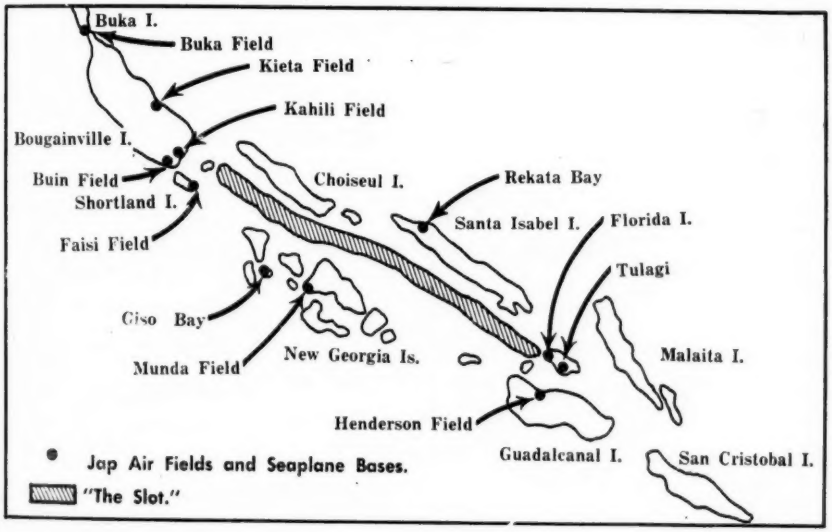
Our B-17s had damaged vessels in the occupational forces during the afternoon of 3 June, 670 miles southwest of Midway. A PBY had spotted them and sent in their position. The Jap striking force, consisting of six carriers and supporting elements, was not located until 0430, 4 June. It is very difficult without carrier support to defend a single, unsupported island with limited airdrome space and facilities, against a formidable force such as the Japs had that day. Midway, approximately 1,300 miles from Hawaii, is just a coral atoll. This coral base could not "mother" enough airplanes to provide for its own security, and for strike and defense purposes. To protect against carrier attacks, sea searches must be accomplished in the probable lanes of approach, strike missions must be made to destroy the source of attacks, and the base must contain a fighter defense large enough to protect it from the attacking planes. If base facilities are destroyed or damaged, the whole offensive character of the base vanishes.

One of the two runways was put out of commission in the initial attack, but the Jap striking force was too busily engaged with our own strike force airplanes, both

land and sea, to bother with the airdrome after the initial attack. I won't go further in describing the battle of Midway except to say that the Japs were reckless in the use of their carriers, and had they continued those tactics down in the Solomons, it might have been much harder for us to drive them out. They grew very cautious after Midway, as they lost four of their large carriers there.

The Joint Chiefs of Staff had decided on a limited offensive starting in the Solomons in August 1942. Staging for this operation was already underway during the battle for Midway. Two Marine divisions, with land based fighters, dive bombers, torpedo bombers, and carrier task forces were making ready to assemble in the South Pacific. Our heavy bombardment group (11th) was ordered to proceed to the South Pacific. We were designated the Mobile Hawaiian Air Force. We departed 17 June via Christmas, Canton, and Nandi in the Fiji Islands.

At this time, two airdromes had been started in the New Hebrides, one at Efate in the south, and another on Espiritu Santo in the north, the latter being 620 miles from Guadalcanal. We were dubious of our ability to hold the Fiji-New Caledonia-Brisbane line, as these places were all vulnerable. Our intelligence on the Jap progress in that area was limited, so in moving into those advanced bases (they were advanced in those days) we were "leading with our chins," as our security measures were not

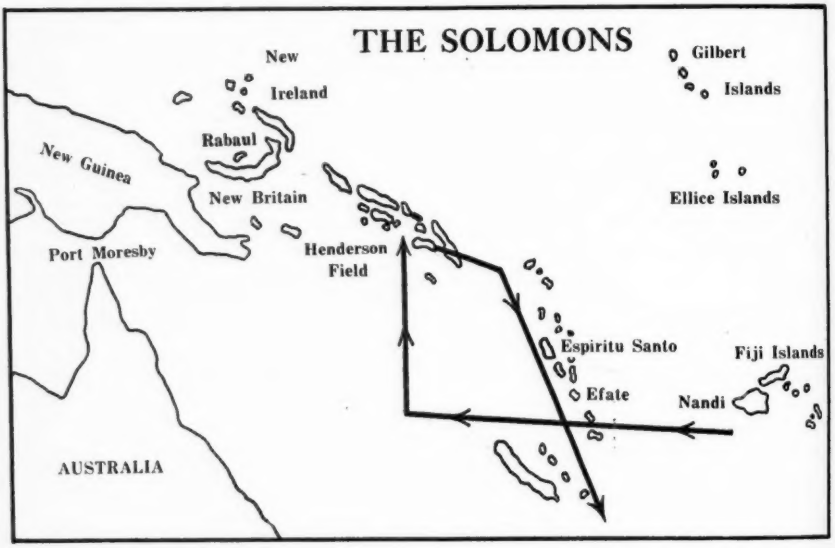


This shows the route of invasion forces of the Japs in attempts to retake Guadalcanal during the critical months of August, September, October and November 1942. This was also the route of the combat Jap naval vessels that nightly reinforced the Jap garrison on Guadalcanal and shelled Henderson Field. Distance, Henderson Field to the Buin-Faisi area, 370 statute miles.

very good. Initially one squadron was assigned to the airdrome on Fiji, one to Efate and the remaining two were at Plaines des Gaiacs, on the west coast of New Caledonia. Great distances separated these units and communications were very poor.

New Caledonia is midway between Australia and the Fiji Islands, a distance of 800 miles to either, and 400 miles southwest of the New Hebrides. Upon arrival there, I learned that D-day was set for 7 August, and that Admiral Gormley, Commander South Pacific, through Admiral McCain, Commander (Air) South Pacific, desired that we hit Guadalcanal and Tulagi (across the straits from Guadalcanal) a week before D-day. It was now 20 July.

We had an improvised airdrome at Efate 750 miles from our target. We had not seen the so-called field at Espiritu Santo. We had none of our organizational equipment or maintenance personnel, as they were all loaded on boats which would be there in a month, perhaps. We had only the flying crews and other critical personnel that we could carry by air in our B-17s.



Route of Naval Amphibious Force 1-12 August 1942.
Approximate distances: New Caledonia—Efate, 350 mi.; Espiritu Santo—Henderson Field, 640 mi.; Henderson Field—Buin-Faisi Area, 370 mi.; Henderson Field—Rabaul, 630 mi.; Henderson Field—Fort Moresby, 890 mi.

We had no Air Force Service Units for our use, so it was really a pathetic situation, but we had to go to work. Miles of water separated our bases; there were no aids to navigation; we had nothing but ourselves and our good old B-17s and an intense desire to fight the Japs.

We inspected the field at Espiritu Santo on 21 July, after landing a B-17 there very cautiously. It was just a strip to get a B-17 down, not an air base. Landing

fields were selected by picking a suitable cocoanut grove, on fairly level terrain. These trees are usually found on coral formations. The trees were bulldozed and the top soil, which was very thin, scooped off, the rest consisted of a truck and shovel job as the coral made a fine base for a landing strip or hard standing. The engineers did some wonderful work with the crude and sparse equipment that was available at that time.

As I look back, I wonder how we ever operated heavy bombardment airplanes from those fields. They would have been considered dangerous in peacetime or later in the war. It is surprising what we can do in any emergency. The skill of our pilots under these trying conditions averted destruction of personnel and equipment. When engineering equipment did arrive, landing strips could be constructed very readily where coral was available. Coral is easy to handle, is porous, and if covered with a binder (macadam) it is superior to concrete. There was no coral near the original strip at Guadalcanal (Henderson Field) and consequently, we had a very poor strip there during our early operations.

But let us get back to the initial operations. We decided to operate ten B-17s from the strip on Espiritu Santo, as that was all it would take. This was 150 miles closer to our target. The rest we would operate from Efate, 775 miles from Guadalcanal, which meant that we could carry only a half load of bombs. We needed the other bomb bay for gasoline. Imagine starting an offensive with that pitiful force and under those conditions. We were using a strategic airplane and were prevented from carrying a capacity load of destruction because of the lack of operating bases. Remember, our ground sections and organizational equipment did not arrive for six weeks so that we lacked, among other things, messes and food. There was an army engineer company and a naval detachment on Espiritu Santo, so we could "chisel" some meals from them, but we lived mostly on native fruit which was delicious and abundant. We had no servicing equipment, so had to fuel our airplanes by hand. The gasoline drums were dumped in the bay and we had to swim them to shore. One day the tide went out and 10,000 drums floated out to an island twenty miles away. We finally retrieved them, but not without loss. The Navy did help us a lot on some islands, as they brought all their servicing equipment with them, having adequate sea transportation. At Guadalcanal, the Marines did all our servicing for the first few months.

We operated against the assigned targets in the Guadalcanal area until D-day. On D-day we put out our B-17s for security search only. The carrier task force went to work on Guadalcanal and nearby Florida Islands on the morning of 7 August. There was very little opposition there, but the Japs reacted quickly with their fleet. They steamed down from the Rabaul and Shortland Island areas and interdicted the Marines so strongly that they did not get all their equipment and supplies unloaded. Our naval forces were forced to retire. This meant, among many other things, that the Marines did not get their engineering equipment unloaded, hence no equipment for construction of airdromes. Without air defense, the Americans in the Solomons were helpless. After our occupation of Guadalcanal, we were unable to operate B-17s from Henderson Field for about six weeks. In the middle of September, we staged two or three search B-17s out of there, as we could cover 600 more miles in sea search toward Japan. The Marines did use some old antiquated captured Jap equipment for awhile to level the strip sufficiently for the use of fighter and lighter planes, such as dive bombers and torpedo bombers. The place was under bomber attack in daylight hours, and shelling from the hills and

from surface vessels at night, and the air defense of the island was accomplished initially by marine and navy fighters, dive bombers and torpedo bombers. One army fighter squadron (the 67th) arrived for duty at Guadalcanal 25 August. Later on, army P-39s arrived. The P-38s, the most effective fighters, did not finish their training and did not report to Guadalcanal until mid-November. The Army had two squadrons of B-26s in New Caledonia, but they were in training and did not see any service at Guadalcanal until November.

The field (Henderson) that the Japs started before we landed was badly situated, and with our limited engineering equipment we had to improve it as best we could. The plans called for two fighter fields and one bomber field, but we had to be content with one, even if it accommodated only one-third of the planes necessary to defend the island. I say island, but we occupied only about five miles of beach and about a mile inland. The front lines were practically at the edge of the airdrome. We were frequently fired on by Jap ground personnel while taking off and landing.

The Japanese tactics in the Solomons had begun to take form by the last week in August. In the Buin-Faisi area of Bougainville, at Vella Lavella on Kula Gulf, and at Rekata Bay on Santa Isabel, the Japanese had bases easily supplied from Truk and Rabaul. By September, enemy men and supplies were being loaded on fast vessels, namely, destroyers and cruisers. These Jap ships would leave lower Bougainville after our last air search, would retire from that area in the late afternoon, steam at a fast rate, unload their men and supplies at Cape Esperance or east of there, shell Henderson Field and return before our search airplanes could find them. By that time they would be out of range of the strike force airplanes at Guadalcanal. The B-17s could have taken care of this, but we could not operate in force from the muddy field at Guadalcanal. Thus, the enemy in the bush at Guadalcanal would be reinforced to the point of mounting an attack on the beachhead at which time other Japanese, supported by a sizeable portion of the Imperial Navy, would be brought down from the Mandates as an occupation force.

Such actions were feasible as long as the enemy controlled the sea approaches to the Lower Solomons. Once these were lost, as they were in the mid-November engagements, the enemy was obliged to rely for reinforcements solely on the "Tokyo Express." Meanwhile, air attacks on Henderson were carried out daily from Rabaul via Kahili Field in southern Bougainville, and various harassments were maintained against the American garrison. These latter were ingenious sleep-destroyers. "Oscar," a sub, surfaced nightly in the dark off Lunga, reconnoitered and, threw a few shells at either Tulagi or Guadalcanal. After midnight, an asthmatic two-engine bomber variously named "Louie the Louse," "Washing Machine Charlie" or "Maytag Mike" would lay a stick of bombs across the field. Later on, when we got low altitude bombing equipment together with radar, these tactics were discouraged.

The foregoing gives a general idea of conditions in the South Pacific prior to, and immediately after, the Japanese invasion. The account that follows will concern mostly the strategic operations of our B-17s.

The landing strip was not operative for B-17s until 20 September, although we did land a few search airplanes there before that time. Actually, the field was not suitable according to our specifications until 1943. The Marines would curse the poor old B-17s when one would get stuck in a bomb crater or dig a hole in the runway. We did not like to keep the B-17s at Henderson Field any longer than necessary in the early days, as the field was

shelled almost nightly and bombed almost daily. It was too exposed for heavy bombers and suffered as well from lack of service. However, with this wonderful old airplane, we cut our hearts out daily by sacrificing 600 miles of range of a strategic airplane. Lack of security and service made it necessary.

Dispersion, taxiways, hardstandings and a durable runway are necessary for heavy bombardment. Henderson Field had none of them. Our usual procedure was to take off from Espiritu Santo before daylight, stop off for gasoline at Henderson and go on our mission. If we received a position report from our search airplane within striking distance from our base at Espiritu Santo, we would go directly to the target. This happened frequently, but we had to stretch the range of the B-17s to do it. Returning after dark to a small island in the type of weather prevalent out there, with no navigational aids, required excellent navigation.

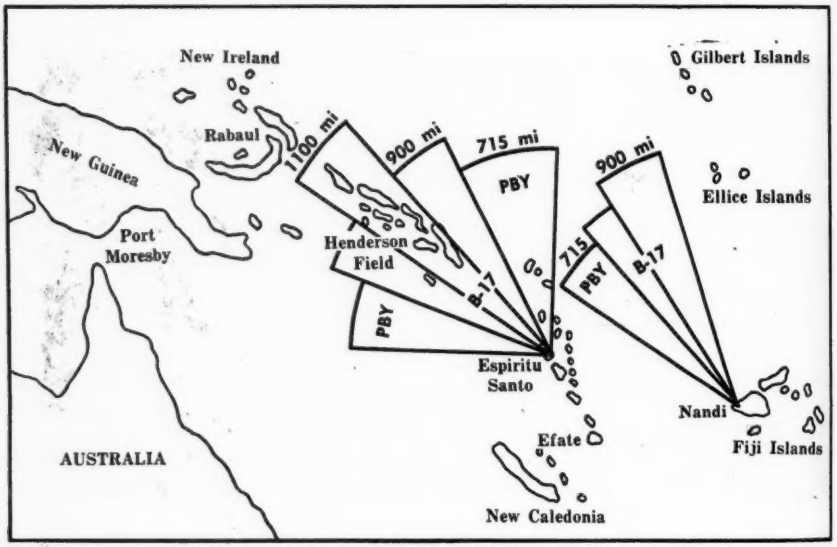
We did not brief our crews prior to hitting maneuvering targets, as everything was executed according to standard operating procedures. This may seem to be a slipshod way to operate, but we found it to be the easiest and most expeditious once we became trained in correct tactics and prccedures.

B-17s of the 11th Bombardment Group halted Japanese battleship of the Fuso class when one Fortress obtained a hit with a 500-pound bomb. Following B-17s obtained additional hits and when last seen the ship was burning furiously. The action occurred north of Savo Island on 13 November 1943.

We were forced to change our bombing tactics and techniques after a few weeks in that theater. With few exceptions, we were concerned mostly with bombing maneuvering targets. We had practiced a few simulated missions on towed targets and on the old battleship *Utah* in Hawaii before the war. These missions were mostly group missions. Frequently a few squadron missions were scheduled as practice

for squadron leadership. In other words, our pre-war practice missions were designed for use by a greater number of airplanes than we could muster in the South Pacific. We never ran out of targets and, as stated previously, we had to exercise *economy of force.*

Our experience at Midway convinced us that we should bomb from lower altitude. We bombed from 10,000 to 20,000 feet at Midway. We now decided to employ a five plane formation, in a V, against a surface vessel whether carrier, troop transport, battleship, cruiser or destroyer. This was our attack formation. We did not necessarily fly this formation to and from the target, as our defensive set-up consisted of two flights of three planes each, in staggered formation. Upon reaching the target area, if the formation still contained six airplanes, the sixth would fill out the diamond in the attack run. We issued orders that no attack would be made from over 15,000 feet, as the target could maneuver out from under the bomb pattern of five airplanes bombing from above 15,000 feet. We operated generally from nine to thirteen thousand feet, although antiaircraft fire was pretty rough at that altitude especially when we hit battleship and cruiser task forces.



The normal sea search required to secure the approaches to the Solomons and related areas in 1942. This required many B-17s and Navy PBYs in addition to B-26s from New Caledonia and Hudsons from Efate. Frequently, B-17s were flown from Henderson Field to reconnoiter the area far to the north toward Truk Island.

During the months of October and November we experienced few misses. We selected key flight commanders, navigators and bombardiers to execute our standard operating procedures, and they became efficient in their use. As the striking force was always on a fifteen minute alert dur-

ing the hours of daylight, we had only time enough to give the pilots, bombardiers and navigators the essential information. The search airplane, in making a contact, would report the position, direction of travel, composition, and rate of travel of the target. This information would be given to the key personnel and takeoff would be accomplished. They were sufficiently trained to interpret this information without additional briefing. Normally, that was all that was necessary; however, if anything else was necessary they would be briefed accordingly. We always had plenty of targets, so that the strike force was never sitting on the ground very long. If the search plane position report was inaccurate, the strike force would have to perform search upon its arrival at the setforward position of the target. Many an airplane came home "milking" its last drop of gas because of this extended flight plan.

In addition to our strike force missions, we were required to perform reconnaissance missions. These were over-water flights extending out in some areas to one thousand miles. In order to keep COMSOPAC informed of enemy surface movements, each B-17 from Espiritu Santo would cover a sector extending either five or six degrees, depending on the visibility. The two B-17s staging through Guadalcanal would cover the "hot" sector through the Buin-Shortland-Faisi area in south Bougainville and the northern part of the island at Buka Passage. Targets abounded at Bougainville's lower tip where the harbor of Tonolei and Buin settlement lay behind densely wooded Shortland Island, and in the "Slot," funneling down to Guadalcanal between the New Georgia Group and Santa Isabel and Choiseul to the east. Tonolei, protected by Kahili Field, received shipping from Rabaul, Palau and Truk, while sightings in the "Slot" included every category in the Jap Navy.

This reconnaissance was necessary in order to guard against surprise attacks, especially carrier attacks, as they were the most dangerous. A battleship shelling, however, is something you will never forget. The search must be put out a distance of 1,000 miles along all probable enemy approaches to the island, in order to intercept the day before the anticipated attack by the striking force. This means that the search airplane must make contact and send this report back to the base in time for the striking force to fly out and make its attack the day before the enemy hits. Night attacks were not too effective. Carriers usually try to attack just at dawn to take advantage of an approach to the target under cover of darkness.

B-17s and navy PBYs were used in these long searches. We had to increase the number of B-17s on search, because the PBYs could not stay with the Jap fighters long enough to make a complete contact report. This was especially true up the "Slot" toward Bougainville, or when intercepting a carrier task force. The PBYs would send in a contact report and that is the last we would hear of them, as they would not get to develop the report. The PBY was a two-engine flying boat much slower than the B-17 and with only two fifty-caliber guns, while the B-17 had twelve fifties, all in good defensive positions.

One day a PBY sent in a contact report with the postscript: "I am tracking—notify next of kin." That was a famous remark down there, and I guess it indicated the mental attitude of the PBY crews when under attack. They really took a beating.

A review of the start of the war in the Pacific indicates that we not only lacked airpower, but we lacked the services and the bases to operate. We were unprepared for the war, and naturally it took time to get or produce all our needs. The war with Japan was a *battle for bases.* We

were constantly fighting for bases from which to use our air power to get closer to or at the heart of Japan.

During the critical days at Guadalcanal, we could not use the B-17 in its most effective way. Had we been able to operate from Guadalcanal with four-engine bombers, we could have eliminated all Japanese air and water forces from the Solomons in two weeks. We could have destroyed them before they ever reached their staging place in lower Bougainville, because our search and strike would have taken place 600 miles farther out. We would have denied them those approaches. The importance of the ABCs of the Air Forces—*Airplanes-Bases-Crews*—was never more evident.

So far as their ability to defend themselves and their institutions was concerned, the great democracies were sick nations when Hitler openly massed his forces to impose his will on the world. As sick as any was the United States of America. We had no field army. There were the bare skeletons of three and one-half divisions scattered in small pieces over the entire United States. It was impossible to train even these few combat troops as divisions, because motor transportation and other facilities were lacking, and funds for adequate maneuvers were not appropriated. The Air Forces consisted of a few partially equipped squadrons serving continental United States, Panama, Hawaii, and the Philippines; their planes were largely obsolescent and could hardly have survived a single day of modern aerial combat. We lacked modern arms and equipment. When President Roosevelt proclaimed, on 8 September 1939, that a limited emergency existed for the United States, we were, in terms of available strength, not even a third-rate military power. Some collegians had been informing the world, and evidently convincing the Japanese, that the young men of America would refuse to fight in defense of their country.

The German armies swept over Europe at the very moment we sought to avoid war by assuring ourselves that there could be no war. The security of the United States of America was saved by sea distances, by Allies, and by the errors of a prepared enemy. For probably the last time in the history of warfare, those ocean distances were a vital factor in our defense. We may elect again to depend on others and the whim and error of potential enemies, but if we do, we will be carrying the treasure and freedom of this great Nation in a paper bag.

General of the Army George C. Marshall

Preparation of Map Exercises

Lieutenant Colonel R. H. Holt, *Coast Artillery Corps*
Former Instructor, Command and General Staff College

HAVE you been given the task of writing a map exercise? May you reasonably expect to receive such an assignment in the near future? Hundreds of officers on duty with the National Guard, Organized Reserve, ROTC, and instructors at many service schools have received such an assignment. Dozens of requests are received from these officers each day by the Command and General Staff College and other Ground Force Schools for copies of map exercises. Very frequently the officers making the requests are graduates of these schools and are fully capable of writing their own map exercises. More often than not, it is the form that eludes them, while the contents are secondary.

It is true that well prepared map exercises afford splendid opportunity to give junior officers training in command and staff duties. The past war showed that promotion was rapid and that many junior officers that had started as company commanders finished in key staff positions or important command assignments, positions for which they had had little time to train before the emergency.

Map exercises have definite advantages over other types of training exercises. Some of these advantages are shown below:

a. Any terrain in the world for which maps exist is available. The map exercise therefore, gives great choice in selection of terrain.

b. The map exercise saves time, since students are not required to leave the classroom as is the case in terrain and other field exercises.

c. The map exercise is realistic. Commanders and staff officers of units above the division are required to control subordinate units and issue orders. However, personal reconnaissance and personal contacts are seldom possible.

d. Map exercises have no artificial limitations of safety zones, private property, or under-strength units, all found in the normal peace-time field training.

Map exercises, like all tactical problems, are of two general classes; those of decision and those of execution. In an exercise of decision, the solver must make a definite decision based upon a definite tactical situation. In an exercise of execution, the solver's decision has already been made for him, and his task is that of choosing the best method of carrying out his mission. The distinction between the two types of problems is not hard and fast. Many map exercises require the solver to make a decision and then to decide upon the plan for carrying out that decision. In this type of problem we have a combination of the two general classes.

The individual assigned the mission of preparing a map exercise is usually confronted with a directive from higher authority, which will outline the purpose and scope of the exercise to be prepared. Often the directive will also indicate the type of exercise to be prepared. The scope of the

exercise should be consistent with the training and experience of the solvers, or with an assignment which they may expect in the near future. The exercise should be planned so that it can be presented effectively with the facilities available.

In the preparation and framing of the map exercise, ingenuity on the part of the author is required to produce reasonable and logical situations. Imagination on the part of the author is also essential. These two items, ingenuity and imagination, are a test of the author's ability. Their inclusion produces the realism that facilitates instruction and maintains interest.

Having digested the contents of the directive, the author is ready to go to work on the preparation of his exercise. It is believed that there are certain specific steps which he may take to facilitate his work. The first step is the adoption of a specific form for the exercise. A standard form for the statement of the situation will serve as an aid to brevity, clearness, and quick understanding of the situation. The form should be such that it will permit the problem to be used in all types of tactical problems and exercises.

The statement of a situation usually consists of:

(1) Heading.
(2) General situation.
(3) Special situation.
(4) Requirements.

In many exercises, particularly those involving small forces, the general and special situations can be combined and termed "situation."

The four major items contained in the statement of the situation should contain so much of the following as is applicable to the exercise being prepared:

(1) *Heading.*—The heading includes the office of issue, the nature of the exercise, an identifying number and the date.

(2) *General situation.*—The general situation first lists the maps required, including any special maps or overlays issued with the problem. Then follows a brief statement of the facts known or assumed to be known, to both forces, friendly and hostile. This is for the purpose of general orientation to assist the solver in understanding the situation. It covers the military status of the opposing forces; if necessary, the political aspects of the situation, and any other like items necessary for clarity. The general situation should be *brief* and should contain no unnecessary information.

(3) *The special situation.*—This is a statement of the assumptions and real or imaginary facts, which, taken in conjunction with the general situation, forms the basis of judgment on which the problem is to be solved. Some of the essential features of a special situation are:

(a) A definite statement of the forces involved, including variations from authorized tables of organization, if any.

(b) A statement of the mission of our force, in unmistakable terms.

(c) A statement of the location and disposition of our ground forces at a stated time and in sufficient detail for the purposes of the problem. Nonessential data should be avoided.

(d) A statement of our air situation to include strength and location of supporting tactical air units, and location, strength, and mission of strategic air units.

(e) Sufficient data on which to base an estimate of the enemy situation, both air and ground. The data should be such as to require an analysis in order to arrive at reasonable conclusions as to the enemy's capabilities. Part of the value of the exercise is *lost* when the enemy's situation and capabilities are made so obvious as to require no analysis.

(f) A statement of the date of the operation, in the event that the hour of sunrise or sunset, or season of the year, has a bearing on the problem.

(g) A statement of special weather conditions, when it is desirable to indicate their effects on roads, fords, bridges, streams, visibility, air operations and the like.

(h) Such other assumptions as are essential. These are usually included under the general heading "Notes."

(4) *Requirements.*—Standard requirements call for action, plans, orders, decisions, or portions thereof. The requirement or requirements should be practicable. In a series of exercises, the requirements should be diversified to make sure that all practicable items are covered. Among the fundamental of these which might be mentioned are:

(a) Listing the factors to be considered in arriving at a decision, in order that the solver will develop the thought process involved in arriving at a tactical situation.

(b) Listing the projected plans which are under consideration in various agencies of the command, so as to emphasize the necessity for, and methods of, anticipatory planning.

(c) Stating the actions taken upon requests of lower units for modifications in orders and instructions given them. Such requests are common and call for tact and judgment on the part of staff officers and commanders.

(d) Generally the requirements are stated in one or more of the following forms:

(i) An estimate of the situation.
(ii) The decision of _____.
(iii) The plan of _____.
(iv) Formal orders issued by _____.
(v) The writing of certain paragraphs of a field order.

To complete the form for the exercise, the author should issue to the solvers a solution to the requirements to indicate an acceptable method of solving the problem.

Having established the form for the exercise, we next proceed to work out the details and then assemble them in a logical manner. This is done by first selecting key terrain to be assigned as the objective of two opposing forces. Then considering the time and space factors and the missions to be assigned, we figure backwards in order to get the opposing forces placed in proper and logical positions with missions which will insure the type of operation desired at the objective. The following fifteen steps are considered to be a logical sequence in the preparation of the exercise:

(1) Determine the line of action to be illustrated.

(2) Determine the size of the Blue force to be employed.

(3) Determine the type of problem to be presented. Is it to be one of decision? One of execution? Or one of both?

(4) Select the maps. The selected map should have terrain which is suitable for the type of problem to be presented.

(5) Determine the size of the Red forces to be employed.

(6) Determine the hour at which the action is to take place or the decision is to be made.

(7) *Tentatively* determine the disposition of the Blue and Red forces at the hour at which the action is to be taken or the decision is to be made.

(8) Determine the mission of the Blue force.

(9) Prepare data pertaining to the Blue and Red forces which will serve as reasons for their being in the locations chosen at the prescribed hour.

(10) Draw up a general situation.

(11) Introduce elements that will present alternate lines of action for the situation.

(12) Determine how information of the enemy can best be placed in possession of the Blue commander.

(13) Make adjustments throughout and prepare the special situation.

(14) Prepare the requirements.

(15) Prepare solutions—after the sit-

uations have been completed, not before.

After the problem has been completed it should be surveyed as a whole, and judged according to the following considerations:

(1) The assumptions must be logical and limited to those having a direct bearing on the selected problem.

(2) The problem should be logical, simple, clear, and concise.

(3) It should illustrate the desired principles or lines of action.

(4) It should be framed so that the solution is not obvious. There should be alternate lines of action between which a correct choice can be made only after a proper estimate of the situation has been made.

(5) The problem should be suited to the capacity and degree of military education and training possessed by those to whom it will be presented for solution.

In presenting the map exercises the following items should be arranged for, well in advance of the time of presentation:

(1) A suitable room.

(2) Desks or tables, with chairs.

(3) Required maps.

(4) Supplies, such as paper, pencils, etc.

(5) Public address system, if required.

Ordinarily, the situation is described or issued to a group, and solutions to the requirements are prepared individually. Often, however, the class is divided into staff sections or groups and the requirements are solved by the group as a whole. No fixed rules for determining the time allowed for solutions can be prescribed. More time, generally, is needed when written solutions are required than is necessary for oral solutions. Within reasonable limits, it is better to err on the side of allowing too little time than to give too much.

Summary

Two prerequisites to the writing of a good map exercise are *clarity* and *brevity*.

The situation for every exercise should be stated clearly. The author and all those who review the problem should make a special effort to free it from ambigious and contradictory statements. The author must be careful not to be influenced by a particular solution which he has in mind, as he prepares the problem. His statements, unless they are carefully tested, may mean one thing to him and another to the solvers.

In so far as brevity is concerned, the situation in a good map exercise is presented as briefly as possible. During operations in the field, the situation is a continuing one, and all concerned are familiar with it. On the other hand, in the map exercise, the solver must, at one sitting, grasp and adjust himself to an entirely new situation. Therefore, authors must make every effort to present their situations briefly and in a manner which the solver can grasp easily and quickly. The situation should lead reasonably to the action contemplated.

Our fighting forces in war are always made up of civilians, so a failure to provide for the training of the civilian reserve amounts to nothing less than condemning us to a state of helplessness. A large standing army would certainly be much more objectionable on all of these grounds even if it were not economically impossible to maintain one of sufficient size without impoverishing the country.

General of the Army Dwight D. Eisenhower

If War Comes to the Arctic

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Colonel Kane was commanding officer of Task Force Frigid which conducted cold weather tests in Alaska during the winter 1946-1947.—The Editor.

WINTER warfare in the Arctic or Sub-Arctic regions would provide a test for man and machine more severe than any recorded to date in military history.

When one contemplates war in the Arctic regions it is natural to ask: "What would be the objectives in the Arctic?" An examination of a map will readily show that there are no industrial areas, no great centers of population, no large ports, no network of communication and no great deposits of natural resources in the Arctic.

How then could the Arctic regions figure in any war in the future? The answer, of course, is that since the shortest inter-continental air routes pass over the Arctic regions, these areas contain the air highways over which invading armies may move in the future.

It is now commonly accepted that any future war will start with a tremendous air attack, followed by an airborne invasion. Anyone who has even the slightest acquaintance with the situation in the northern-most areas of the North American Continent will readily admit that an airborne attack is the only feasible manner of attack in those areas.

Since communications as known in the Temperate Zone are non-existent in northern areas, it would be practically impossible to move large masses of troops overland. And as there are no industrial areas in the extreme northern regions, the only objective an invading army could find there would be the existing air bases or areas considered suitable as potential bases.

Winter warfare in the Arctic is such a serious problem that it is believed no nation would risk it unless it felt that it had sufficient force available to achieve a quick, easy victory and push through into the vital areas farther south.

The advantage, of course, will be with the attacker in an invasion through the Arctic, because he can choose the time and the weather which favors his manner of attack. However, if the initial attack fails to achieve complete success, it is believed the advantage will quickly shift to the defensive. That has happened twice in invasions of Russia. The invading armies initially had the advantage, but as their communications lengthened and supplies became scarce, the advantage quickly passed to the defending troops who had short communication lines, ample supplies and comfortable shelters.

Although a war may start as an airborne attack, if a stalemate develops, it is certain that other ground forces will be employed as soon as they can be transported to the battlefield by any means available. Someone has said that no matter how or where wars start, they all end in mud.

The question as to which season of the year favors the invader in the Arctic seems to have no clear cut answer. For a nation that has a large number of troops, well trained in winter warfare and inured to the rigors of an Arctic winter, it would appear that the winter would be the ideal time to launch an attack. This would be particularly true if the nation attacked were one poorly equipped for, or untrained in winter warfare. The winter season offers many advantages. The flying conditions at that time are ideal. The frozen lakes and rivers covered with a layer of soft snow, furnish excellent emergency landing fields for airplanes and gliders, and also ideal drop zones for paratroops. Even the frozen tundra, covered with forty inches of snow, affords better emergency landing facilities than the spongy marshes of the summertime.

While the rigors of winter warfare for ground forces are very severe in extremely low temperatures, the personnel of the air force and airborne troops transported in heated planes will not suffer any appreciable loss in efficiency until ground operations start.

It is admittedly difficult for troops to move on foot through deep snow, but in many cases it is easier to move over deep snow than over the spongy muskeg found almost everywhere in the summertime. There is no way to escape the wet muskeg in the summertime, as it exists wherever the permafrost prevents subsurface drainage. Another distinct disadvantage in a summertime attack is the presence of an enormous number of mosquitoes that thrive in the stagnant water of the small lakes and ponds. However, inasmuch as the anopheles mosquito is rarely found in the Arctic the control of malaria should not be a serious problem.

A glider which was used for supplying troops on maneuvers is here shown being towed into a pick-up position by a D-7 Bulldozer.

Although an airborne attack could be launched at any time of the year, it is believed that late fall or early winter offers the best conditions for such an attack since at that time the snow is not deep and the lakes and rivers are frozen sufficiently to support light tracked vehicles. Because of the difficulties foot troops encounter in

moving through deep snow, it is believed that any plan for an airborne attack in the Arctic would provide for jumping directly on to the objective or in a drop zone in very close proximity to it. At extremely low temperatures, it would also be necessary to drop stoves, fuel and small, light tents to protect troops required to remain in the open for protracted periods.

The most serious problem confronting any force operating in the Arctic will be that of logistics. In any area where ninety per cent of the goods consumed have to be imported, neither the invader nor the defender can hope to live off the land or even obtain any assistance from local sources.

In the initial stages of an Arctic war, almost all supplies would have to be airborne. This would certainly be true for the invading forces and would also be true for the defending forces unless foresight and vision had provided for large reserves of supplies.

This fact would place a definite limit on the size and weight of the weapons available to the attacking force.

If the invading force can seize air bases early and maintain air supremacy, the problem of supply by air is relatively simple. If at any time, however, the invader loses complete mastery of the air, or is forced out of his air bases and compelled to depend on air drop for his supplies, his supply problems increase one hundred fold. Supply by air drop is one of the most costly methods of supply yet encountered in military operations. Even when goods are well packaged and dropped by parachute, the losses are considerable as many crates fall into areas from which they cannot be recovered. When free drop is employed, even at low altitudes, there is an enormous amount of wastage from broken packages and widely scattered supplies. If suitable, cleared areas are available, supply by glider is much more practical and efficient method than that of dropping supplies.

The question is often asked: "Will an Arctic war require an entirely new weapon or vehicle?" The answer to that at the present time, is no. All the present weapons and vehicles will function at extremely low temperatures if proper lubrication is provided. The very best of maintenance is required on all weapons and vehicles and, of course, the rate of movement for both man and vehicle is greatly reduced in deep snow. Wheeled vehicles

Infantrymen on snowshoes moving supplies forward by means of a toboggan.

will have very limited use in Arctic warfare and will probably be replaced by full-track vehicles. Present vehicles will undergo some changes to give better over-snow traction and more rapid starting of engines.

Arctic warfare will probably see no great changes in tactical doctrine. The principles that have been sound in temperate climates apply as well in the extreme cold. Men operating in deep snow, and low temperatures, become exhausted much sooner than under more favorable conditions, and will have to be replaced after very short periods of combat.

This means that units must have much greater depth in attack formations, and

reserves must be readily available with sufficient transportation to move them quickly to front-line positions without taxing their energy unduly. Reserves must also be protected from the elements as long as possible before their employment, otherwise they will be nearly as exhausted as the troops they relieve.

Maintenance becomes a very serious problem at extremely low temperatures. Any given operation such as replacing a track on a tank will require five times as long at −50°F. as it will at +40°F. This means that all maintenance personnel must be greatly increased if a reasonably high standard of maintenance is to be secured in Arctic operations.

Casualties will be much greater in Arctic warfare than in any war to date. Added to the normal hazards of the battlefield will be that of freezing. An uncovered human hand will start to turn white after two minutes exposure at −50°F. After one hour of exposure at this temperature, it would probably have to be amputated. Even a slightly wounded man usually suffers some shock and loss of body heat. At temperatures below 0°F. a wounded man must be placed immediately in a very warm casualty bag and given hot beverages if he is to survive. This means that all medical personnel must be greatly increased over that provided for in present tables of organization, and sufficient equipment must be provided to insure prompt and efficient evacuation of wounded. If this is not done, the percentage of deaths among the wounded in Arctic warfare will be staggering.

Medical troops evacuating a casualty by means of a towed toboggan.

Since history has not recorded to date a single war in the Arctic regions, there is no experience to draw upon in visualizing what a war in those areas would really be like. Although the experiences of Napoleon's Army in Russia in 1812 and those of the Germans during the winter of 1941-1942 give a valuable preview of what may

be expected in Arctic warfare, the conditions those armies encountered were not nearly so severe as might be encountered in the coldest regions of the Arctic.

There is a great deal of difference between conditions encountered at −30°F. and those met at −60°F. Likewise, operating in populated areas where there are buildings and roads is much less difficult than in a barren land where habitations and roads scarcely exist.

Operations in the Arctic regions will always be classed as special operations and will call for very carefully selected and trained men. Extremely heavy casualties will be the price that must be paid if this precaution is not taken. Also, ground troops must have the very best of equipment in excellent condition and big reserves of supplies.

Although war in the Arctic may be initially an air or airborne war, if it should develop into a stalemate, the side which can first bring its armor to bear will have a big advantage. Any ground combat in the Arctic, involving the use of armor, would place the aggressor force at a distinct disadvantage, as it is unlikely that anything other than the very lightest of armored vehicles could be brought in by air transport.

Although the tank moves more slowly in deep snow than on cleared ground, it can serve a double purpose in breaking trail for the advancing infantryman, and at the same time covering his advance by fire. The tremendous shock action of armor is no less valuable in the Arctic than elsewhere. In fact, it appears to be more pronounced, because the foot soldier cannot escape the tank, inasmuch as foxholes in snow offer no protection, and it is practically impossible to dig foxholes in the frozen ground. Although deep snow reduces the speed of a tank, there are few real obstacles to a tank in the Arctic. Rivers and lakes are usually frozen solidly enough to take even the heaviest tanks. Where thin ice has to be crossed, it can be reinforced with timber. Forests in the Arctic are no serious obstacle because at very low temperatures all trees except the very largest ones will snap and break like match-wood when struck by a tank. Any tracked vehicle can cross with impunity a mine field which is covered with eighteen inches of snow.

In view of the tremendous strides that have been made in recent years in the development of weapons and in the tactics and technique of the various branches of

Soldiers wearing the new fiber-glass uniform.

the armed forces, even the most experienced military man hesitates to assume the role of prophet. However, it is believed that a round table discussion on future Arctic warfare by a group including scientists, explorers, and army and navy officers who have had experience in the Arctic Regions, and who are familiar with modern weapons and equipment, would find almost unanimous agreement on the following salient points:

1. If war comes to the Arctic, it will come in the form of a tremendous air attack, or possibly a sneak airborne attack followed by a big advance of air forces.

2. An enemy advancing through the Arctic will probably seize what bases he needs and destroy all others rather than destroy all bases.

3. No nation will risk warfare in the Arctic until it has ample supply of the very best equipment obtainable and has an ample force of men trained especially for cold weather operations.

4. No military force will tarry in the Arctic any longer than is necessary. It will probably leave sufficient force to protect its lines of communications and then hurry on to its main objective farther south.

5. The best way to stop an air invasion through the Arctic is to throw a deep air block in the way of the enemy. This requires a warning net and intelligence organization of the most dependable type.

6. In Arctic warfare, fortune will always favor the side with the "warmest suits" and the most "reliable engines." Neither raw courage nor even all the intangibles together can ever compensate for the lack of proper equipment and the Arctic "know how."

Whether at home or abroad, whether training or fighting, whether in the mountains or the desert, the Arctic or the tropics, our forces had to be supported with a constant stream of military equipment and supplies suitable to the operation in which they were engaged. The American soldier was provided with the best fighting tools, the best food and clothing, the best living conditions and the best medical care that our scientific and industrial genius could provide and the circumstances of his employment would allow.

Report of the Chief of Transportation

Why Commanders Should Know About

Motivation and Frustration

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This is the second in a series of articles by Majors Sylvester and Longley on Military Psychology. The first article was published in the December issue of the MILITARY REVIEW.—The Editor.

Part I—Motivation

THE purpose of this article is simply to discuss the need of giving the soldier an incentive so that he will not only freely *accept* the hardships imposed by military life, but will *want* to do his job. Of all the complicated machines that modern mechanized war employs, man is still the most intricate.

One way to understand what makes a man "tick," to understand his machinery, is to approach the matter from this point of view: Man spends his life fulfilling his needs. When these cannot be satisfied, then he is frustrated. Frustration of a strong, powerful need may lead to anger or to depression, anxiety or inefficiency. The needs that men encounter are of many kinds. Basically, however, they may be divided into groups, the physiological or bodily, and the intellectual or social needs.

The basic bodily needs include oxygen, water and food. All of these elements are necessary for life. It can be said that we are driven to fulfill these needs unconsciously, instinctively. On the other hand, the intellectual or social needs are acquired. We have developed their necessity and learned how to fulfill them.

When a man's needs are so adjusted that the strongest and most powerful ones are satisfied by the job that he is doing, then his morale is good. It begins to appear then that the problem of good morale is closely knit with the problem of motivation. In other words, the problem of morale is the necessity of tying up a man's needs with the activities of his job *so that he wants to do what he has to do.* If that is the case, his morale is good. On the other hand, if his needs are frustrated, the man's morale is poor. Therefore, it should be obvious that it is highly necessary for the military leader to understand the mechanism of human nature so that he can maintain in his men a high state of morale, and keep them operating at maximum efficiency.

Since the conditions imposed by war are unusual, the commander must realize that when men are simply fulfilling normal human needs, they are not necessarily efficient soldiers. He must instill in them new needs which they will strive to fulfill. This fulfillment will make them do a good job under the conditions of battle. He must teach them new needs and help them to fulfill these needs. This he does through the process of motivation.

To motivate is to cause a release of energy toward a desired goal. In terms of the military leader, to motivate is to inspire men to want to do their jobs. Effective motivation is determined by three factors, the goal that is to be realized, the energy that is to be released

to achieve that goal and the means that are to be used to direct and control that energy. To explain: The goal is obviously the task that soldiers are expected to do. The energy is the effort that they will put forth in achieving the goal. The tools that are to be used to direct and control that energy are the incentives that the leader implants in his men. In short, the leader must be able to impart to his soldiers the incentives to do their jobs with zeal and industry.

It is these newly instilled motivating incentives which alter the soldier's personality so that he wants to do things that are contrary to his basic nature—to risk his life day after day, to endure constant tension, the fear of death, the steady loss of friends, the sight of the injured, the bleeding, the dying. It is these new incentives that help make men want to fight.

We will now consider and evaluate some of the possible approaches which can be used in motivating soldiers. First, let us consider the incentives that are based on the soldier's opinion concerning the necessity of a given war and the merits of our cause. Although the attitudes of some vary from strong convictions to deep cynicism, the most usual reaction is one of mere acceptance of our part in the conflict. This is due to the fact that there is much that is lacking in the political education of American troops. This lack cannot be entirely supplied by the Army. Rather, it is the result of the attitudes which prevail in typical home communities. Fortunately, however, strong motivation of this type has not proved to be necessary to good motivation in combat. It is not a strong incentive.

Without doubt the strongest incentive which soldiers should be given is that which makes them want to identify themselves with their group; to be loyal members of the team.

This process of identification is based on affection and begins early in life. Identification means the feeling of belonging to, being a part of a group of people. The earliest identification made by a man is with the members of his family circle. Later on, the range of identification expands to include the school, the church, the community and finally the nation itself.

Not all Americans have been able to develop a broad range of identification. There are people who feel loyal only to themselves and are not identified with any other individuals or groups. Others remain identified only with their families. They feel strong resentment at having to make a sacrifice for some larger group. Many such men have been taken into the Army, but their ability to make sacrifice and give service has been largely due to external pressure. They perform their duties and carry out tasks mostly through fear of punishment which may follow refusal.

It must always be remembered that the human tendency to identify one's self with a group can do damage as well as good if the soldier's expansion is immature and he retains for instance, too strong an identification with his family. It may be the family rather than an *esprit de corps* which dominates his actions in combat. Sometimes this domination is good, but more often it is not. Fathers and mothers, even wives, may urge men to get into the fight, and make them feel ashamed to stay out. More often families plead with their sons to stay out of combat, to let someone else take the risks. If a man has already become strongly attached to a combat unit and is a stable well-balanced person, this may result in quite determination to conceal his combat activity from the family, but again it may produce considerable conflict. This faulty motivation leads the soldier to demand avoidance of combat, and if he

is forced to participate in battle, he is motivated only by fear of punishment.

Fortunately, when commanders make an effort to weld their individual soldiers into a strong team, most men are able firmly to identify themselves with this fighting group. This identification makes them efficient and successful soldiers. It should be pointed out that group identification has many aspects. First of all, the soldier is identified with his squad, then with his platoon, company, battalion, regiment, division, and so on up to the point where he is identified with the whole nation.

In addition to political education and group identification, there is another incentive to which leaders sometimes appeal to stimulate the fighting energy of their soldiers. This incentive is realized when the leader appeals to his men to fight for fighting's sake. The value of this incentive has been overemphasized. Few Americans anticipate pleasure from destruction or killing. Although some chronically hostile individual may be fascinated by the prospect of getting all the fighting he wants, he frequently finds it impossible to adapt his irascible personality to the teamwork and coordination necessary in battle. The most frequent reaction among American troops to the destruction of war is disgust. Not until he feels that he has been personally injured by the enemy, usually after the death of close friends, can the American soldier think of killing enemies without inner revulsion. Ruthless killing and disregard for life are foreign to our training and tradition. Having to kill is usually something that is accepted as necessary. It is a fallacy to consider that blind hatred of the enemy is necessary for good fighting morale, for hatred and gratification from killing are sources of guilt to the hater and are not the best motivation for objective, impersonal combat.

There is, however, an aspect to this incentive of fighting for fighting's sake that is acceptable to the men, because it is in line with their previous training in sports. The idea of pressing on to victory over a strong opponent by virtue of superior force, skill, and training appeals to any American. The tactics employed by an infantry division or a formation of aircraft require the kind of talent needed in the planning of the strategy of a football game. The gridiron maneuvers of through-the-line-plunges and end-runs, blocking and tackling, T-formations and double-wing-backs, find their counterpart in battle. The satisfaction that comes from victory by superior maneuver, deception or strategy is one of the important props to good motivation. I say prop because the men soon learn that the enemy plays for keeps, and that a life and death struggle is not the same as a game of football.

The incentive to fight created by political education, group identification and "fighting for fighting's sake," belong to what may be termed a phase of *mass* psychology. At the same time we are willing to admit that there is such a thing as personal motivation in the make-up of a soldier. It may be as we have indicated before, that his family is encouraging him to fight and win honors to his credit and to theirs. Perhaps he comes from one of the few American families which does have a long military tradition. Perhaps his father or an uncle was a soldier in the last war and the younger man is motivated by a desire to equal or excel the record made by that relative. However, the closer a man comes to battle, his eagerness prompted by personal incentives rapidly becomes tempered by the realities of the situation. After a few exposures to the stress of fighting, these realities are intensified. At that point, a great strain is placed on this individual motivation—these personal

incentives. As the soldier begins to realize what he has let himself "in for," it is only natural that he should search his soul as to why he ever allowed it to happen to him. Blind faith and unquestioning submission to fate are no part of the American character.

Thoughts of friends at home peaceably going about their jobs in civilian life or in military installations in the zone of the interior, arise and weaken the strongest personal motivation. The personal necessity to fight the war appears dim in view of the millions at home who are not fighting or suffering in any way. Any desire to be a hero evaporates in the heat of combat, and most of the men are content to have a hero's role thrust upon them only if such a situation cannot be avoided. They are not looking for it. Personal motivation tends to weaken in face of the stress of combat. The father who lived through the last war to tell about his combat experiences may not be so important to the son who sees little chance of living through this one.

If the weakening of personal motivation—personal incentive—were not counter-balanced by some other force the desire to fight would rapidly diminish. The additional force necessary to keep the man's determination to continue in combat at a high level stems from the effects of the group morale which we have described above as identification with the group. It is therefore more than the simple sum of the individual motivations found in the men before they come into combat. It is the result of relationships which they have build up within the group and the intense loyalty stimulated by a man's close identification with his group. The men are now fighting for each other as a team and develop guilty feelings if they let each other down. Men fight best when they seem to be fighting more for someone than against somebody. It can be truthfully said that the personal fate of a man becomes something of secondary importance. If his own future becomes dim and his span of life seems brief, the fighter is not unduly disturbed since so large a portion of his self-interest has been transferred to the interests of the group. He thinks less about himself and more about others than at any previous period in his life. When asked why soldiers are willing to die, the late Ernie Pyle said: "They die for each other." This spirit of self-sacrifice so characteristic of the combat personality is at the heart of good morale and effective motivation. It is not easily achieved in the individualistic and self-assertive tradition of America. When it is once achieved it must be carefully and continually nurtured. If it is lost, the battle is as good as lost. Military men have long recognized this fact and have considered the team spirit of the fighting group the most important single factor of success in battle. More important, for example, than equipment, training, freshness or the advantages of terrain.

The principal factor governing the maintenance of this type of spirit is the quality of leadership. Perhaps it is sufficient to say at this point that if the commander demonstrated his technical ability, his impartiality, his good judgment and, in short, his knack for welding the fighting group into a solidly knit team, then he will be able to mold his men's weaker personal incentives into on group incentive that will carry them through successfully.

Part II—Frustration

As we pointed out in Part I—*Motivation*—human beings are literally pushed through life by a constant series of drivers which impel them to do this, that, and the other thing. However, civilized living restricts the expression of emotions and limits the satisfaction of needs. Modern conditions impose these

restrictions; Army life adds to them. For example, during the primitive stages of human existence it was considered perfectly proper to kill an enemy in anger or in fear, or to run off with his wife if one wanted to. Today these drives cannot be so freely expressed. The denial of a drive is called frustration. Frustration is a barrier which interferes with our mental life and destroys its inner harmony. Everybody seeks the fulfillment of his needs, but such a goal is not easy to achieve when one lives in a world of conflicting aims and ideals.

To be alive is to be in conflict. Conflicts are unpleasant, but not dangerous to mental health if properly handled. If, on the other hand, they are improperly handled, mental conflict can result in what a layman calls a nervous breakdown, or they can even in extreme cases be the factors in a major mental disease.

Most of our conflicts, our frustrations, are small ones, which are temporary, easily resolved and unimportant. However, the unnatural conditions of military life, especially in combat, are apt to create serious conflicts for the soldier which he would not otherwise encounter.

It is necessary here to explain the distinction between frustration and conflict. Frustration results when a drive is impeded by an external or internal force. Conflict, on the other hand, implies two drives pulling at cross-purposes. Whether to go on pass or to stay in camp. Whether to read or sleep. Frustration is exemplified in a soldier who wants a pass, but is told he cannot have one; the officer who wants to be promoted, but is informed that no position vacancy exists. These conflicts and frustrations may be small, temporary, and easily settled; but they are always with us just like death and taxes. Some people react to them in such a way that they can easily solve the conflict—overcome the frustrations. Those people are said to have a high frustration tolerance.

Again there are others who cannot so easily solve their problems, and they spend their time battering their heads against the stone wall, as it were trying both to "have their cake and eat it." The leader must be aware of the presence of frustrations and conflicts in the lives of his soldiers. In guiding them and attempting to understand them completely, it is well that he should know the various means, the psychological methods of resolving conflicts. Then, when he observes that a conflict or frustration is impeding the efficiency of individuals in his military group, in counseling them he will be well equipped to suggest methods of resolving their conflicts and overcoming their frustrations.

As we discuss these various methods we shall point out that some are usually satisfactory, others not. First we shall outline several *indirect* methods of handling conflicts and frustrations, then we shall explain the *direct* method.

The first indirect method commonly used is called sublimation. Sublimation means to redirect a drive, an incentive, to do something from which one is restricted, into a channel that will bring it within the boundary of approval. For instance, when direct expression of the sexual emotions is not possible, one can turn to indirect expression. Writing poetry, reading romantic literature, writing letters, or just by keeping busy. Using the same sexual drive as an example, we find that it is sometimes indirectly expressed by socially unacceptable action, such as telling filthy stories, writing obscene poetry, singing smutty songs. This type of behavior is our second means of resolving conflict, substitution. The person who finds expression for his sexual drive in art, music or dancing is sublimated. On the other hand, the one who tells off-color jokes is substituting. Sublimation changes

the quality of the drive by raising it to a higher plane. Substitution often leaves the drive unchanged and its apt to be accompanied by a feeling of self-disapproval, guilt and inferiority. Obviously, such a method of resolving a conflict or frustration is unsatisfactory, whereas sublimation is very desirable.

The third method of resolving a conflict is called compensation. It means earning approval by doing a thing in which you can succeed to counterbalance failure in some other activity. A person who is born with ugly features, when in repose, compensates by developing a charming smile and by learning how to converse interestingly with others. A soldier who cannot manipulate a weapon may make a good cook. Thereby a desirable trait has been developed to make up for the undesirable one over which the individual has no control. One general rule to be followed in developing asset qualities is to select activities in which the man in question is certain to have some measure of success. Effective living is largely a matter of balance. Let one force operate too strongly and the balance is lost. Compensation is wholesome. If the new activity is well chosen and the balance maintained, the compensation reaction to inferiority can cause a man to strive very hard to achieve success in some other activity. Some of our greatest men have become great because they felt themselves to be inferior in social ease, and tried to compensate through developing scholarship, inventive genius or military prowess.

Though compensation often is a good and natural remedy, over-compensation produces results that are not so desirable. The little man who talks too loudly and too much; always itching to fight a bigger fellow and well deserving the nickname "bantam," illustrates over-compensation to a feeling of inferiority.

In addition to sublimation, substitution and compensation, another indirect method of resolving conflict or frustration is termed "a flight into fantasy." That is to say, the person in whom a drive is thwarted frequently finds satisfaction in imagining, dreaming, either by day or by night that the drive is satisfied. The flight into fantasy can take many forms. There is the conquering hero who imagines himself badly wounded and slowly bleeding to death, leading his small handful of faithful soldiers victoriously against the superior forces of the enemy. His subsequent return and miraculous recovery and the crowning moment of his life when the President pins the Medal of Honor upon his chest. Oftentimes a person who flees reality does not create his own dreams; he buys them ready-made in the form of movies, adventure stories, love stories, etc. The essential mechanism here is that of identification again. The thwarted individual as the hero of a pulp magazine story, flies the skies with his guns roaring.

The flight into fantasy for temporary relief from conflict is common to everybody. It is abnormal and dangerous only when it occurs too often and too strongly and when it leads to no constructive action. The daydream can be of great inspiration to the individual who actually tries to create in real life the things he has created in the dream. But when the dream becomes more satisfying than the real thing, he quits working for the real thing. Mental hospitals contain many individuals who are starving to death, while in their inner dream life, they are attending great banquets.

Hysteria is another unsatisfactory indirect method of resolving conflicts. Most of us have noticed that a headache is always worse when there is a disagreeable task to be done or an unpleasant situation to be faced. Such reactions are common to all and are well within the realm of normalcy; some soldiers feel a little sick just before an attack. These same reactions in extreme form can become seriously

harmful and are known as hysteria. The bodily symptoms of hysteria, real though they seem to be, result simply from paying exaggerated attention to one's self. As a result of this close attention to one's body, sensations come into consciousness that have never been experienced before. The individual does not know what they mean and seizes upon them as an excuse for his failures. Eventually he reaches a point where he enjoys ill health. The victim of hysteria should not be encouraged to rest but to try to lose his anxious self-regard through activity in other contacts with the external world.

A more common method of indirectly adjusting a frustration is through the use of alcohol. The thirst for alcohol is not like the thirst for water. Drinking alcohol is not a physiological habit as is drinking water, but rather a psychological habit. Individuals become slaves to alcohol not because their bodily tissues demand it, but because the spirits give a temporary escape from the realities of life. When completely under its influence, a man's sense of values is altered, his judgment consequently impaired. A moderate use of alcohol on the other hand, normally tends to relax tired minds and bodies, removes the user just a little from the problems which are causing conflict in his life. This period of relaxation prepares the moderate user of alcohol for a new approach to the solution of his difficulties.

Finally, rationalization is the most common means of indirectly resolving conflicts and of overcoming frustrations. In its approved form, rationalization implies the process of arriving at reasons to account for one's practices or beliefs, when these are challenged, either by one's self or by others. It reaches its harmful stage when it implies the ascribing of false motives to one's behavior. It is another way of bolstering the ego. The danger is that one may go so far in the protection of himself that he has no time for action, but spends his days in building up elaborate excuses for his failures, or in explaining away things he is ashamed of having done. This is the sour grape attitude so well told in Aesop's Fable of the fox who decides that he does not want the bunch of grapes when he learns he cannot get it. Most familiar as rationalizations are "Alibi Ike's" classic words, "My hand slipped," "The sun was in my eyes." A little rationalization is fine, but it is something like garlic—it goes a long way.

There are many indirect methods of handling conflict and solving frustration. Among the most common are sublimation and substitution, compensation, flight into fantasy, rationalization and escape through the use of alcohol. Some of these reactions can be good in part. In mild form they are normal and are present in all of us. In extreme form they are what we may term cures which are worse than the disease. Satisfactory living is largely a matter of balance. In dealing with mental conflicts, prevention is far better than cure.

Direct action to resolve conflicts and solve frustrations are often the most successful means. The direct method simply means this: In many conflicts the opposing forces are obviously of differing strength: For example, suppose it is just before a particularly difficult attack. The soldier realizes that he can invent an illness and escape the immediate danger of being killed or wounded. At the same time he realizes the consequences of such cowardly action: the contempt of his fellows, the possibility of charges of desertion when his ruse is discovered, disgrace to his family, etc. In such a case the only thing that a man does is to examine systematically the pros and cons, thereby bringing all the many factors together and weighing them with regard to their relative merit. The decision is made in accordance with what is apparently of the greatest net value. It should be pointed

out that though factors such as fatigue and stress make this decision difficult, strong motivation goes a long way toward maintaining a man's balanced judgment in spite of these weakening forces.

Again, some conflicts result from incomplete knowledge of the facts and disappear at once when the necessary information is obtained. An example of this type is realized when a soldier is trying to decide whether to go on leave or stay in camp for awhile longer. When he learns that he has a chance of promotion if he postpones his leave, the decision becomes easy. Further information about the possible alternatives will usually aid one in his choice, by either dissolving the conflict entirely or rendering the two conflicting forces of obviously unequal strength and value.

In this connection it is important to point out that the efforts of the chaplain do much towards the adjustment of these difficulties. Religion urges men to sublimate rather than substitute, to use alcohol moderately, to rationalize honestly, to seek a direct solution to their conflicts by a frank evaluation of the elements involved.

In summary, we can say that military life whether it be in the zone of the interior, the communications zone or on the battlefield, imposes certain restrictions upon individuals. These restrictions give rise to conflicts and frustrations. Such problems can be adequately resolved or they can be permitted to go unchecked. The good leader keeps a careful eye on his men to see that conflicts which they encounter do not become so serious or overwhelming that the efficiency of his men is impaired. Above all, the failure of adequate solution to conflicts may lead to many abnormal forms of behavior or even to breakdowns. When the fighting man encounters this state of affairs he is rendered useless, becomes a liability to the army. On the other hand, the skillful commander, by giving his men powerful incentives to fight for the good of the unit, by assisting them to prevent and overcome frustrations, can be assured that his every man is producing his utmost for the good of the command.

Finally, military leaders must realize that his knowledge should be not only in his possession, but should be shared by *all* commanders and staff officers subordinate to him. An officer or noncommissioned officer who refuses to recognize the value of these techniques in the proper handling of men is bound to hamper the success of the command.

We know that in the world today nothing of great moment can be accomplished without leadership, be it business or charity—or be it war. It is more true in war than elsewhere. You cannot fight a battle or run an Army without discipline. Efforts otherwise have never succeeded in the past. They cannot succeed today.

Secretary of the Army Kenneth C. Royall

The 4th Armored Division in the

Relief of Bastogne

Lieutenant Colonel Delk M. Oden, *Cavalry*

The following article is one of a selected number of monographs prepared by officers attending the 1946-1947 class of the Command and General Staff College, which will appear in the MILITARY REVIEW from time to time.—The Editor.

FROM 9 November 1944 until 8 December 1944, the 4th Armored Division, a member of the U.S. Third Army, had participated continuously in that Army's fall offensive.

Due to terrain, weather, and poor trafficability, the division had suffered high casualties in both men and machines. Neither had been replaced prior to the Battle of the Bulge. The division was less than fifty per cent strength in tanks and infantrymen. Despite recent losses, however, the division was battlewise, famous, and had an extremely high *ésprit de corps.*

Third Army planned a breakthrough of the Siegfried Line north of Rohrbach on Tuesday, 18 December 1944. The 4th Armored Division had the mission of exploiting the breakthrough and driving to Mannheim on the Rhine River.

On Sunday, 16 December 1944, the German counteroffensive, known as the Ardennes Offensive of "The Battle of the Bulge" was launched, cancelling the proposed offensive through the Siegfried Line and causing Third Army to turn north to attack the German south flank.

Initially, the German offensive, led by tanks in mass, met with excellent success, completely routing the U.S. VIII Corps which was disposed along an eighty-five mile front on the border between Germany and Belgium and Luxemburg.

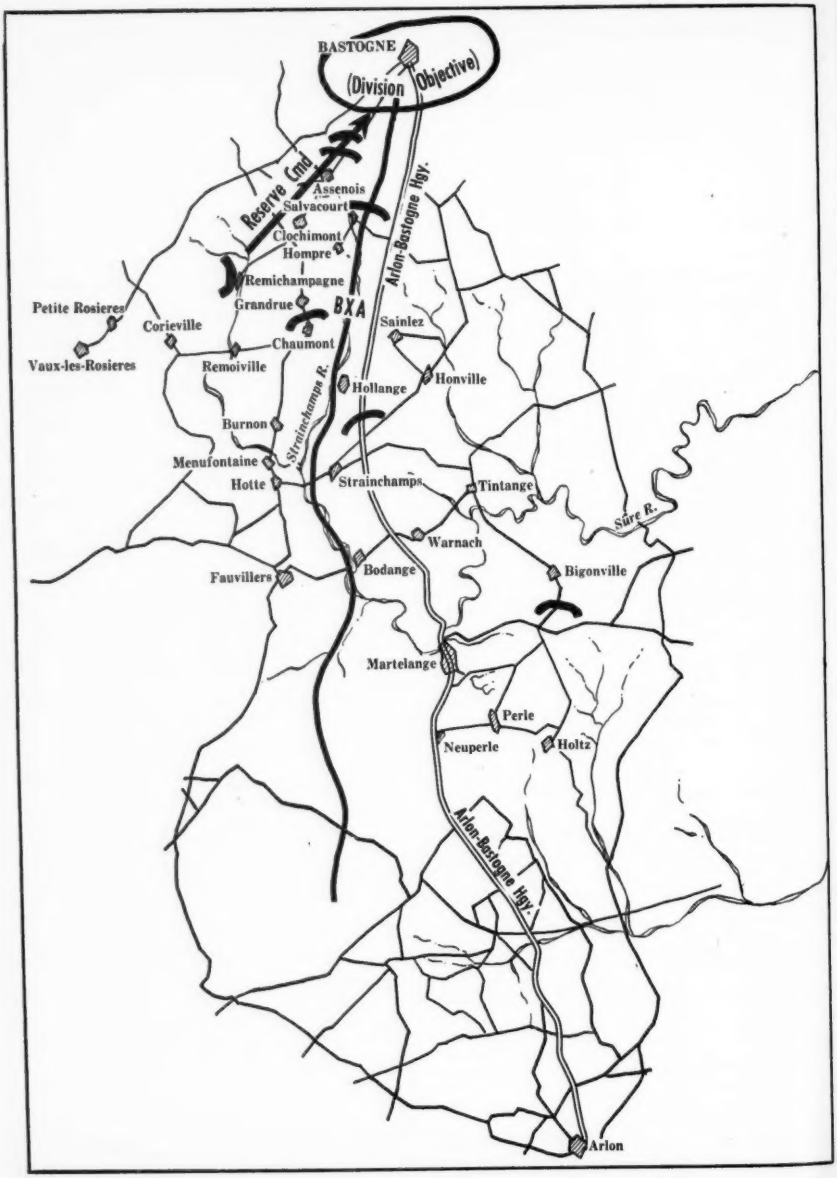
Geographical Features

Despite the initial successes of the German armor, the terrain in the Ardennes is, primarily, of a defensive nature. Many rivers cut through the country, running generally northeast-southwest. These rivers flow through deep ravines, leaving bluffs and steeply sloped hills forming the ridges. The few main roads throughout the area follow the valleys, but ample secondary roads form a good tactical roadnet. Much of the area is heavily wooded, with forests of the "ever-green" type, and during most of the winter months, the ground is frozen solidly and covered with ice.

The two most important road centers in the Ardennes are at St. Vith, in the northeast, and Bastogne, in the south. A major highway runs south out of Bastogne through Martelange to Arlon, Belgium. The distance from Arlon to Bastogne is twenty-four miles.

Dispositions and Mission of 4th Armored Division

On 19 December 1944, the 4th Armored Division, with headquarters at Cutting, France, about five miles west of the Saar River and due east of Nancy, was relieved from XII Corps and assigned to III Corps, the headquarters of which was located at Arlon. The III Corps ordered the division


BASTOGNE
(Division Objective)
Reserve Cmd
Assenois
Salvacourt
Clochimont
Hompre
Remichampagne
Arlon-Bastogne Hgy.
Petite Rosieres
Corieville
Grandrue
BXA
Sainlez
Vaux-les-Rosieres
Chaumont
Remoiville
Hollange
Honville
Strainchamps R.
Burnon
Menufontaine
Hotte
Strainchamps
Tintange
Sure R.
Warnach
Fauvillers
Bodange
Bigonville
Martelange
Perle
Neuperle
Holtz
Arlon-Bastogne Hgy.
Arlon

to move at once to the vicinity of Arlon, a distance of 160 miles.

At midnight, 19-20 December, the division marched in a column of Combat Commands, Combat Commands "B," "A," and "R" in that order. Route: Cutting, Morhange, Luppy, Pont-a-Mousson, Briey, Longwy, Arlon. Upon arrival at Arlon, III Corps ordered Combat Command "B" to proceed to the vicinity of Fauvillers and from there to send a task force into Bastogne with the mission of contacting the 101st Airborne Division, which was holding off strong German attempts to move west through the city, learn the friendly situation and render support if necessary. The task force proceeded into Bastogne from the southwest, contacted the 101st, but was drawn back to Combat Command "B's" assembly position immediately on Corps orders. No contact was made with the enemy. This task force consisted of a tank company, an infantry company, and a battery of armored artillery. Combat Command "B" sent no reconnaissance out from the assembly area.

During the night of 20-21 December, the Germans encircled Bastogne, completely serving the 101st Airborne Division's lines of communication, leaving that division isolated. The German 5th Paratroop Division, estimated strength 8,000, held the enemy line below Bastogne.

The remainder of the 4th Armored Division had completed assembly in the vicinity of Arlon by midnight, 20 December. The situation was vague. Friendly troops, sick with exhaustion and lack of food and proper clothing, stumbled in from the north and east. Most of these troops came from the 28th Infantry Division, the 9th Armored Division, and Corps Artillery and Engineer units which were caught in the initial surprise avalanche of the German offensive. They told grim tales of heroism and escape, but showed little signs of hysteria.

The Attack

On the afternoon of 21 December, it was decided to delay no longer. The 101st Airborne Division was surrounded, and the only way to get them out was for Third Army to attack.

At 0400, 22 December, the 4th Armored Division led the Third Army assault. Moving out into a blinding snowstorm, the tanks and infantry drove into the hazy confusion and unknown to the north. Combat Command "A," consisting of the 35th Tank Battalion; 51st Armored Infantry Battalion; the 66th Armored Field Artillery Battalion; Troop "A," 25th Cavalry Reconnaissance Squadron; Company "A," 24th Armored Engineers; Company "A," 704th Tank Destroyer Battalion; and Battery "A," 489th AAA AW Battalion (SP), attacked north from Arlon along the main Arlon-Bastogne highway with the mission of opening the route into Bastogne and securing the division's right flank. The 26th Infantry Division was on the right of the 4th Armored, but approximately five miles to the east. No friendly troops were between the two divisions.

Combat Command "B" on the left attacked at 0600 from the vicinty of Fauvillers with the mission of driving up the west bank of the Strainchamps River and opening a corridor into Bastogne. Combat Command "B" consisted of the 8th Tank Battalion; 10th Armored Infantry Battalion; 22d Armored Field Artillery Battalion; Troop "B," 25th Cavalry Reconnaissance Squadron; Company "B," 24th Armored Engineers; Company "B," 704th Tank Destroyer Battalion; and Battery "B," 489th AAA AW Battalion (SP). The Reserve Command remained in the vicinity of Arlon, prepared to repel attacks on the division flanks or to reinforce either Combat Command. Division headquarters remained with that of III Corps at Arlon.

On 22 December 1944, Combat Command "A" moved slowly but steadily all morning in two columns. The Infantry Task

Force moved along the main highway while the Tank Task Force moved to the east thereof, rejoining the main column at Neuperle by advancing through Perle, Luxemburg to the east. Just north of Neuperle, Combat Command "A" was held up by a road crater, not reaching Martelange, until 1300. Just south of Martelange, the enemy was finally met. The Infantry Task Force hit the enemy with tanks and infantry, drove him into the city, annihilating two companies of paratroops within the town. This fight continued until past midnight.

Combat Command "B" made slow progress on the left, leading with infantry afoot. Advancing through Hotte and Menufontaine, the enemy was encountered in such strength that the command was only able to reach Burnon by 2100. While "buttoning up" for the night, orders were received from division to continue the attack all night. The offensive was resumed at 2300. At this time, Combat Command "B" encountered even stiffer resistance than previously.

The Reserve Command moved to an assembly area midway between Arlon and Martelange.

On 23 December 1944, Combat Command "A" cleared Martelange by 0300, found all bridges blown over the river, and established a bridgehead along the edge of the high plateau which overlooks the city from the north. Corps Engineers rushed up to build a Bailey bridge, but due to the inexperience of the troops involved, completion of the structure was delayed until 1700.

By that time the ground was completely frozen, returning full cross-country mobility to the division for the first time since early October. Morale soared. In view of the improved terrain conditions, the Tank Task Force was passed through the bridgehead at 1700, and by 1800 had lost one medium tank to antitank fire, but had wiped out one infantry company and two 75-mm antitank guns. With orders to continue the attack all night, Warnach, on the right of the highway, was by-passed by part of the force and attacked at 2200 with light tanks and infantry. Forward elements reached the high ground just south and east of Strainchamps.

Combat Command "B" continued the attack all night, 22-23 December. By daylight only one mile had been gained when the enemy threw a strong counterattack into the east flank of the command. This attack was beaten off, and the advance continued to Chaumont which was cleared out by 2300. Combat Command "B" was unsuccessful in attempting to fight north out of the town.

Due to an enemy buildup in the vicinity of Bigonville with the attendant threat to the division right flank, the Reserve Command moved to Holtz where it received small arms and tank fire from the north. Reserve Command attacked at 1330, clearing the approaches to Bigonville by 1600. At 1700, 200 enemy reinforcements moved into the town from the north.

On 24 December 1944, shortly after Combat Command "A" had cleared Warnach and the advance was continuing, the enemy attacked from Tintange with infantry and tanks. A night tank battle ensued. Combat Command "A" left no security forces in the town of Warnach so the enemy, with his counterattack, reoccupied it with strong tank and infantry troops. The remainder of the night was spent in assembling the command north of the bridgehead, prepared for further effort. Warnach was attacked at 0915 and finally cleared by 1715 to include the woods to the east as far as the Surbach River. It was now apparent that, in order to accomplish its mission of securing the division right flank, and in view of the enemy's tenacious attempts to cut the main highway, Combat Command "A" needed more infantry and was forced to clear the area east to, and to hold a line along, the Surbach River while advancing northward. At 2215, the 1st

Battalion, 318th Infantry, 80th Infantry Division, was attached to Combat Command "A." The attack on the right was further slowed, inasmuch as the tanks were given a support role to the two attacking infantry battalions.

At 0300, the Germans counterattacked Combat Command "B" in Chaumont with two battalions of infantry, twenty-two tanks, and with heavy artillery support. Combat Command "B" lost eleven tanks in this fight and was forced back to the high ground overlooking Chaumont from the south. There, further German attacks were beaten off and at 2100, the 2d Battalion, 318th Infantry, was attached to Combat Command "B."

To the south and east, the Reserve Command hit Bigonville at 0715, not clearing the town until 1400. Although many of the enemy were killed and over 200 prisoners were taken, Company "C" of the 37th Tank Battalion had nine tank commanders killed by sniper fire, including the company commander. During the night, Reserve Command was ordered to move to the vicinity of Bercheux; Troop "C," 25th Cavalry Reconnaissance Squadron, attacked in the new area.

On 25 December 1944, Combat Command "A" cleared the woods north of Warnach, took Strainchamps and moved up to Hollange.

Combat Command "B" retook Chaumont and the high ground to the northeast and northwest of the town.

The Reserve Command was ordered to attack toward Bastogne, and at 1100, attacked Vaux-les-Rosieres, Petite Rosieres, thence southeast to Cobreville, and had cleared Remoiville by 1800. Air support was superior all the way. The division command post moved to Bodange.

On 26 December, Combat Command "A" continued battling the stubborn enemy on the east, tying the division right flank along the Surbach River. Hollange and Honville were cleared by 1730, and Sainlez was taken.

Combat Command "B" took Grandrue, Hompre, and the high ground north and northeast of Salvacourt. Extremely high casualties in infantry were suffered during the day.

At 0800, Reserve Command attacked, and by 0955, held the high ground west of Remichampagne. Following an artillery barrage on the town, tanks and infantry had it cleared by 1055, with the bridge captured intact. Air support broke up many enemy counterattack efforts on the flanks. By 1500, Clochimont had fallen, and at 1600, with a time-on-target of ten volleys from eleven artillery battalions falling on Assenois, the 37th Tank Battalion and 53d Armored Infantry Battalion of the Reserve Command roared through the town and on through the woods to the north where they contacted the defenses of the 101st Airborne Division at 1645.

Thus, a part of the division's mission was accomplished. It was not until three days later, however, that Combat Command "A" succeeded in finally clearing the main north-south highway into Bastogne and securing the division's right flank.

Constant enemy counterattacks threatened the right flank of the division, as the Germans attempted, time and again, to close the circle around Bastogne. Due to superior air and artillery support, however, these attempts were successfully thwarted.

The 4th Armored Division suffered heavy casualties in this operation, both in men and equipment. These were: seventeen medium tanks, five light tanks, four mortar carriages, seven half-tracks, and eleven general purpose vehicles. In personnel: sixty-three killed in action, 309 wounded, eighteen missing.

The enemy, on the other hand, lost twenty-six tanks, seventy-eight large caliber artillery pieces, eleven antiaircraft guns, 151 machine guns, fifty-four miscellaneous vehicles, 3,238 prisoners,

1,606 wounded, 2,758 killed. Our forces also recaptured sixty-five U.S. vehicles of various types. Most of the enemy casualties were suffered by the 5th Paratroop Division, leaving its estimated strength at 500.

Conclusions

In making a study of this operation, it will be noted that the 4th Armored Division was assigned two difficult missions in succession. First, they were ordered to make an extremely long strategic march over an unknown route without adequate prior reconnaissance. Such a procedure is a dangerous one, but, fortunately, no great obstacle was encountered in this instance. Secondly, they were ordered to attack into an unknown situation, with no idea as to where the enemy would be met, but knowing a real fight lay somewhere between the line of departure and the objective.

The major points in this operation, subject to criticism, are:

1. The failure of Combat Command "B," on 20 December, to send reconnaissance to the north and east, at least as far as the Surbach River. The commander of Combat Command "B" knew the intense efforts of the enemy to capture Bastogne, and of the hazy situation to the east. Had he sent out reconnaissance, he might have determined the enemy's intentions in that area early enough to have circumvented the latter's attempts to cut the main highway south of Warnach, and thus have expedited the relief of the 101st Airborne Division by two days.

2. The failure of Combat Command "B," on 22 December, and of Combat Command "A," starting on 25 December, to lead with tanks slowed their paces considerably. Except for such employment as attacks on fortified areas, river crossings, etc., the tanks of an armored division should lead as the striking force, even though the proportion of tanks available is less than that of infantry. Only through maximum utilization of the armored fire power inherent to an armored division can such an organization maintain the speed of operations which justify its existence on the battlefield.

Lessons

1. The strategic mobility of an armored division was well demonstrated in this operation. Alerted at Cutting, France, the division moved a distance of 160 miles and closed within twenty-four hours. Although tired, and with additional maintenance requirements resulting from the long, rapid march, the division could have launched a coordinated attack by daylight on 21 December.

2. Maximum utilization was made of terrain. Despite operating in country which, as a whole, abounds with defensive characterists, it will be noted that the division advanced its combat commands along ridge lines which ran into the objective area. Taking proper advantage of what favorable terrain exists often enables large armored formations to operate in areas not normally considered appropriate for such units.

3. The enormous fire power of armor was exhibited in this drive. A great quantity of ammunition was expended with resultant effects. The high casualties suffered by the elite German 5th Paratroop Division attests to the fire power and violence of armored assault.

4. It is believed that the commander of the division used his reserve correctly and with maximum benefit to the accomplishment of the division's mission. First he employed it against Bigonville to knock out a threat to the right flank. Then, when the situation cleared and the leading Combat Commands were making considerable inroads on the enemy position, attracting most of his efforts south of Bastogne, the Reserve Command was thrown in where the enemy was weakest, drove into the enemy defenses, and on to the objective in a crushing, violent assault.

Five Basic Supply Jobs

(*Part II*)

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This is the concluding part of this article. Part I appeared in the December 1947 issue of the MILITARY REVIEW.—The Editor.

Functions of the Requisition and Procurement Branches

IN this discussion, requisitioning and procurement are considered together as the process of securing supplies. In a small base the operations might well be performed by one small unit. In a large theater, local procurement would be such a large job that a separate organization, outside the G-4 supply group and extending into all of the sections, would probably be necessary.

One of the first jobs of the communications zone G-4 branch is to determine what items can be procured locally and to clear the list with the zone of interior. This is an important step. It permits the War Department to cut back production, or, if the articles are already on hand or scheduled for production, it permits decision as to the best method of accomplishing supply. In some instances, however, where the raw materials are normally exported from the zone of interior, it may be more advantageous to manufacture and ship the completed item rather than ship the raw materials and buy the finished product locally.

Within the depot or supply echelon there is one group which puts articles on the shelf and another which makes issues (distributes). The requisitioning procedures would be similar to those in the zone of interior. Armies would call for Classes I, III and V supplies directly on advance section depots. Classes II and IV supplies, if any large quantity were involved, would usually be supplied from other communications zone depots. Advance sections depots would refill from rear communications zone depots.

The requisitioning branches in G-4 and in the technical services of communications zone headquarters are the points of contact with the overseas supply divisions at the zone of interior ports of embarkation and with the War Department. Based on the supply control studies prepared by the technical service requirements branches, the apportionment between ports or base depots requested by the technical services distribution branches, and the tonnages allocated to the particular service concerned, detailed requisitions are prepared. The mission is best performed when the requisitions indicate the quantities to be shipped, the period during which shipment is to be made, the justification for the request, and the markings to be placed on the packages so that they will flow smoothly to the proper port, and, if possible, to the particular depot in the communications zone without passing through a classification depot.

Requisitioning and following up requisitions submitted to the zone of interior is a detailed job, dependent upon well established procedures and the exist-

ence of exceptional communications. During active operations in a large theater to which several million tons of supplies are being shipped each month there is a constant exchange of teletype, radio, and telephone messages with the zone of interior overseas supply division at the port. Cancellations, checks on availability, checking on back orders, emergency requests, changes in shipping dates, tracing particular shipments to particular ships, and many other operations demand accurate follow-up records and much rapid informal transaction of business.

The local procurement functions are similar to those within the zone of interior, except that the problems introduced by dealing with nationals of a foreign country are present. From the strict supply viewpoint the principal jobs include the furnishing of specifications, programming the rate of production to meet the quantities set up as demands, in some cases arranging for raw materials and for their allocation, assigning facilities and inspections.

Approximately thirty-nine per cent of the supplies assembled for the invasion of France in 1944 were procured in United Kingdom. Procurement operations continued throughout the war, solid fuels and construction materials being the principal purchases.

It is obvious that requisitions cannot be prepared by forces which have just arrived in a theater. As stated under the discussion of requirements, automatic shipment is the general rule until the requisitions can produce supplies. During our occupation of the Atlantic bases leased from the British in 1939, the units shipped their organic equipment to the ports of embarkation, the War Department Technical Services shipped shortages and initial maintenance to the ports. The technical services followed these shipments with periodic maintenance shipments on an automatic basis. General Patton's force in North Africa received automatic shipment for many months. The build-up in the United Kingdom in 1943 was initially an automatic shipment.

The mission of the procurement and requisitioning branches may be summarized as comprising those operations necessary to secure supplies for the command concerned in accordance with quantities and phasing indicated in the supply control reports and to provide for their delivery into the distribution system as requested by the distribution branches.

Functions of the Storage Branches

Storage includes the operations of receiving, storing, or warehousing, and shipping supplies in accordance with distribution instructions.

The storage branch and the distribution branch work together on assigning depot missions to insure facilities being adequate to handle the load imposed. After missions are assigned, the storage branches continue studies of the expected loads and secure space, equipment and labor to perform the necessary operations.

The over-all space requirements can be determined from studying the supply control data and from experience factors for handling the various classes of supply. The detailed space requirements must be based on a specific assignment of depot missions, a statement of the levels to be carried and information concerning the areas and troops to be served.

The allocation of handling equipment is based on similar factors. There is always a shortage of this type of equipment and rigid control must be exercised from the start so that all services and installations may get a fair share of the available items. Most of these items are of mixed commercial types and require especially close attention to maintenance.

The technique of storing and handling different types of supplies must be closely prescribed; storing barbed wire, dynamite,

blood plasma and watch parts will require different methods and facilities.

Warehouse procedures, especially inventories and locators, are most important to efficient supply operations, and must be started at an early date. Even old established theaters have difficulties with locators and inventories. Early in World War II additional supplies were rushed to one old base. When it became apparent that the area would become a more or less inactive theater it became desirable to return excesses to the zone of interior. The best return procedure would have provided for the selection of excess items, and for their shipment through ports, marked or otherwise identified for shipment direct to appropriate depots. The only solution possible was to clear out entire warehouses and ship the article unidentified to a ZI port. The technical services were required to send personnel to the port to identify property and to mark it for shipment to depots.

The function of the storage branch in G-4 of communications zone headquarters is to outline the general plan for depots, assist where necessary in acquiring or releasing space, referee space disputes, allocate materials handling equipment, staff supervise (includes inspections) depot procedures, especially locators, inventories and storage practices, assist in manpower problems, and project future capacities and occupancy of the depot system. In all of these operations there must be close play with the storage branches in the services and sections.

Within the technical services and in the communications zone sections there must be similar supervisory groups charged with these functions, and responsible for the actual operations.

Storage is big business. It is a profession. It is not a job for a misfit or an amateur. The volume of material to be handled in a major theater is tremendous. During April of 1945 approximately 2,000,000 long tons of cargo were handled through ETO ports. Up to VJ-day a total of 45,000,000 measurement tons or over 20,000,000 long tons of Army cargo were shipped to United Kingdom and continental ports. The depot system must be set up by the storage agencies so that these huge tonnages will flow smoothly from the ports to the troops with a minimum of cross hauls or later reshuffling, and without delay in locating needed items.

The establishment of a storage system in a theater such as ETO or the Pacific area is a difficult problem. Time is not available to undertake elaborate construction. Advantage must be taken of the facilities which already exist. There is no time to set up the depot system before the troops to be served arrive. In ETO the depot system necessarily had to be set up as the troops moved inland. In the active areas of the Pacific, the same plan had to be followed. Even in Australia, our troops and their supplies arrived in the same convoys. There the most suitable buildings were wool sheds; unfortunately they were filled with wool. In Sydney, about eighty-five buildings in different parts of the city were taken over for storage in the effort to get supplies off the ships and to give them some semblance of protection. In both ETO and the Pacific, ships were actually used as floating warehouses.

The importance of stressing depot operations under these difficult conditions is apparent. It may be further stressed by the following:

(a) It was frequently easier and quicker for an overseas command to requisition on the zone of interior than it was to locate or transship the supplies within the theater.

(b) In some cases when a report was submitted with respect to the on-hand quantity of a particular critical item, a figure would be cited and qualified with the phrase, "estimated accuracy thirty per cent."

Storage functions in a communications zone may be summarized as the:

(a) Provision of space, equipment and labor for receiving, storing and shipping supplies.

(b) Establishing procedures for, and performing physical storage and handling operations.

(c) Establishing procedures and insuring that supplies are identified as to location and quantity within an installation.

Functions of the Distribution Branches

The mission of the distribution branch is to coordinate and insure the distribution, redistribution, and final disposition of supplies within the command of which it is a part. This supervision, within the command, extends over operations from the time an article is first introduced into the supply system until it is issued to another command or until the article is consumed, abandoned, or disposed of as excess, surplus, or salvage.

The specific duties include:

(a) The assignment of depot supply missions.

(b) Determination of the levels which are to be maintained within the different depots, shops, or installations.

(c) Supervision of the stock control system to insure supplies being distributed in accordance with levels.

(d) Prescribing procedures for the routine issue of supplies to using units.

(e) Publishing regulated items lists.

(f) Issuing directives for the shipment of specific items not handled in accordance with routine procedures.

(g) Prescribing procedures under which items may be sold, loaned, or disposed of as gifts.

(h) Prescribing procedures for the disposition of excess, surplus, obsolete, and salvage items.

(i) Assigning storage and issue responsibility.

(j) Maintaining records which show the over-all on-hand status of supplies.

(k) Preparation of estimates as to the availability of supplies for proposed operations.

The distribution branch is primarily a procedure and operations agency rather than a policy making unit. Allowances are fixed by the War Department or by the general staff within the theater. Distribution branches issue against those allowances. Congress decides policies under which Government property may be loaned or disposed of by sales, as surplus, or as gifts; distribution branches prescribe the procedures within their commands. G-3 secures approval for allocations or for priorities of issue to troops; distribution branches execute the issues. The theater commander prescribes the levels to be maintained in the combat zone and in the communications zone; distribution branches move supplies to meet the levels. In a communications zone, new policies or approved plans for specific issues to meet other than routine operations are normally passed to the supply group of G-4 in communications zone headquarters by a G-4 planning branch. Distribution branch converts these actions into directives for the services or sections.

The function of the distribution branches may be summarized as the staff supervision and direction of the flow of supplies through the supply system in accordance with approved policies.

Functions of Maintenance Branches

Maintenance can be divided into two types of operations. First, the establishment of echelons of maintenance and a system for keeping supplies or equipment in condition. Second, the supply operations incident to the return of unserviceable items either to user or to stock.

From the supply viewpoint, maintenance branches are concerned with:

(a) Focusing the operations of repair operations on those items which are most

needed by the command as a whole, and which are in short supply or which if not repaired will create a replacement problem. This is normally accomplished by the publication of lists of articles to shops within the communications zone and to major commands stating the need for priority in repair of these articles.

(b) The establishment of shops and the allocation of tools and equipment to accomplish repair of critical items or to avoid unwarranted loss of otherwise valuable equipment.

(c) The supervision of spare parts issues to secure the maximum return.

(d) Supervision of spare parts requisitions to insure parts being on hand before equipment must be deadlined for lack of parts.

(e) The establishment of serviceability standards to insure repaired articles becoming true assets, and to prevent needless use of parts and effort on articles which do not justify repair.

(f) The maintenance of records which forecast the quantity of repaired articles which will be returned to supply channels.

Review of Main Supply Jobs

The five main supply jobs may be restated as follows.—(1) Requirements branches are responsible for determining and forecasting the quantities of supplies to be obtained, and are responsible for the maintaining of supply control data for the command as a whole.

(2) Procurement branches obtain supplies either from local sources or requisition on zone of interior.

(3) Storage branches receive, store, and ship (not transport) items passing through the supply system.

(4) Distribution branches control the movement of articles from the time they are received by the command until they are issued, consumed or otherwise disposed of.

(5) Maintenance branches are responsible, from a supply viewpoint, for converting unserviceable articles to serviceable articles, and recommending the establishment of shops and the allocation of spare parts, tools, and other maintenance materials.

In accomplishing these missions all of the branches operate together as a unified supply group.

Time Factors Involved in Setting up a Supply Organization in a Communications Zone

Supply staffs of task forces and communications zones must be carefully provided for and assembled at the earliest opportunity.

The force commander at Santiago, with service troops consisting of only a battalion of engineers and a signal detachment, had to stay aboard his transports, personally supervising the unloading of supplies. He worried less about the enemy than he did about the discharge of the cargo, and issued orders to the commander ashore not to bring on a general engagement. He had to organize his supply staff after landing.

During World War I, the first American troops landed in France during June 1917. During November 1917, a colonel with a staff consisting of an adjutant, a sergeant major and a field clerk, was sent into the area of the 1st, 2d, 26th and 42d Divisions to set up an advance section and take over supply functions. "Casuals were flowing through the area, supplies and mail were arriving with only the markings *Armee Americaine*. One brigade had been ten days without potatoes and eight days without any vegetables. It was common experience not to have bread. One man somewhere in the American Army supposedly knew the definition of a regulating station." On 14 February 1918, organization plans had progressed far enough for the approval of a services of supply. On 9 March 1918, the orders for the Services of Supply (SOS) were issued. On 4 April 1918, the SOS Hq was set up

at Tours. General Pershing was always conscious of the need for a supply organization. He initially estimated that forty per cent of his troops would be in the line of communications. The organization finally formed after ten months was an excellent one and performed an outstanding job.

Prior to World War II, we established a special observers group in London. When we entered the war they were given some minor supply responsibilities in preparation for the arrival of troops. Headquarters, U.S. Armed Forces, British Isles (USAFBI), was established in January 1942. It was later paralleled by the SOS, USAFBI. These units were superseded on 8 June 1942, by ETO and SOS, ETO. In July 1942, the SOS moved to Cheltenham while Headquarters, ETO, and a few SOS planners remained in London. In commenting on the time required to secure coordinated staff action, the ETO General Board Report indicates that the *planners* in London were computing, by item, the requirements to support future plans. "Until June 1943, there was not available to the technical services adequate tactical and logistical information to permit them to compute their own requirements. Essentially the first year (of the SOS) in United Kingdom was a period of orientation and ground work during which valuable operating experience was gained and the foundation laid for the enormous build-up to come later in 1943 and 1944."

The time required to provide a suitable working organization in the European area in our two major wars might well be suited by comparison with the commonly accepted time of one year required to train an infantry division for which Tables of Organization and Equipment and procedures are well formulated.

Time Factors in Accomplishing Supply for a Communications Zone

The minimum time in which requisitions for routine supply of a large theater can be prepared is from fifteen to thirty days. The transmission of the requisition to the zone of interior port of embarkation by air mail or courier would require two or three days.

The minimum time in which an overseas supply division at a zone of interior port of embarkation can process routine requisitions, and in which the port can load for out shipment, is about sixty days. This assumes that articles to be shipped have been procured and are available for shipment promptly to meet requisitions. It also assumes that unusual needs such as those for special equipment, landing craft, large quantities of a specific type of bombs or heavy ammunition, and even such articles as stoves or special clothing have been previously represented to the War Department.

After ships are loaded, convoys must be formed and the convoy moved to unloading ports. One month is a good factor for supply personnel to allow for the operation.

After ships arrive in a large theater approximately one month should be allowed to get supplies through the depot system. This would be an excellent performance and require transport and depot facilities.

If a forward unit requisitioned an item not on hand in the theater and if that item were procured from the zone of interior by routine processes it would take four or five months to effect delivery under the most favorable conditions.

Procurement lead-time for a standardized item in quantity in the zone of interior is nine to eighteen months. A new item, unless of very simple fabrication, probably could not be procured in quantity in less than twenty-four months. One lecturer has stated this two year period is quite well fixed and he has compared it to the twenty-one days period to hatch

a chick; no matter what you try to do about it, you can't shorten the period of production. If the items requested were not on hand and were required in any quantity, this lead-time would necessarily be added. You cannot buy 50,000 special service radios, 200 locomotives, 200 landing craft or 500 tractors, if not already under procurement, on the commercial market.

Summary

The main supply problem in a theater of operations is the creation of a supply organization at the earliest possible date, to accomplish the missions of requirements, procurements, storage, distribution, and maintenance, not only for day to day operations, but projected a year or more into the future.

Junior officers, especially those assigned to combat arms, must take every opportunity to acquaint themselves with these overseas supply organizations and their basic functions if they are to act intelligently in command and staff positions in a logistical war.

For the first time in its history, the United States has become aware that its resources in men and materials are not unlimited. During the war these resources were, in many fields, barely sufficient for the job at hand. There can be no question should there be a future conflict, that the demands upon these resources will be even heavier. They must be husbanded much more carefully and their use controlled much more rigidly than has ever been done in the past. All waste of resources must be eliminated to the maximum extent by adopting the most efficient administrative machinery possible.

General Brehon Somervell

Since shipping was the chief limiting factor, the joint planning procedure was to compute the anticipated shipping capabilities over a period of six months or a year, and gear military operations to those capabilities. In other words, operations were not approved without reasonable assurance that there would be transportation to carry them into effect.

Report of the Chief of Transportation

Reflections On Armor

Brigadier General H. E. Dager, *United States Army*

HISTORY has never before witnessed an expanded and powerful arm characterized by moderate protective armor, fire power, shock action and high mobility employed so boldly, in such large masses, and through such varied terrain, as was American Armor in World War II. Sometimes it was the opening wedge, sometimes the sweeping arm of an envelopment, sometimes the crushing, defense-breaking charge. It provided commanders with an element for tactical surprise, and was of primary use in exploitation or pursuit.

Coordination between infantry and armor was poor in the early stages of the war. Cooperation between the two also left much to be desired. Circumstances, mainly insufficient time to learn the capabilities and limitations of one another, were the cause. With battlefield association came knowledge, experience, mutual admiration and respect, and finally full and complete cooperation and coordination. In short, it became a team, and an unbeatable team at that. Both learned from experience, but experience is usually a hard teacher, and often one or both suffered at its hands, but both learned. In the beginning, modern armor was unknown to many, unproved to all, and unwelcome to a few. It had to produce results, and it did.

The infantryman often complained that armor did not do a clean job, and he was for the most part, justified. Armor smashed through, only partially cleaning out a village or by-passing it completely, attempting to isolate it from supporting troops—to "soften it up" to make the doughboy's task a little easier. In this, it was sometimes very successful and the infantry "mopped-up" without too much difficulty. Sometimes, however, the enemy fled before the armor only to return to give the infantry a very tough fight.

From such actions, there grew a desirable competition between these two arms, and from the competition came that elusive, yet much sought after, "something" for which we, having no word of our own to call it, have borrowed the word *esprit*. Out of this seemingly continuous bombast between infantry and armor, grew combined-arm tactics.

Armored units, like infantry units, were generally highly trained, but individually and not as a team. Armor grew so fast, and generally in areas far from infantry, that the doughboy could, in some cases, reach combat before ever seeing a tank. Then when an armored unit came into an infantry area, eager to get at the enemy, the infantryman would say, "Sure, go ahead. You have armor protection." In the desire to please, to prove his boast, to demonstrate the power and shock action of his battle-wagon, the tanker often encountered resistance which was beyond his capabilities. The resulting sickening casualties in tanks and men caused a terrific let-down to the infantryman, as well as to the tanker. The lesson they both

learned was that they had to cooperate. German 88s, mines, and other antitank defenses were effective against our tanks. Infantry, on the other hand, could overcome such obstacles and open the way for the armor, which in turn, wreaked havoc with enemy rear areas, and exploited the breakthrough to the fullest. But all this had to be worked out the hard way, and the important factor is that it *was* worked out.

Armor's ability to exploit, to work ahead of infantry, to take advantage of an opportune target, brought it many varied missions. It made river crossings without support; it cleared large areas ahead of infantry in infantry zones; it "bulled" its way back and forth across corps and division boundaries with utter indifference to law, custom, maps or overlays, to the consternation of many high commanders who frequently added a few new vituperative words to an already exhausted cussing vocabulary. It broke out from shallow bridgeheads in which it seemed impossible for it to work. It pushed infantry and its equipment off the roads until it became known as a sixty-mile road block—a term sometimes justly applied. It seized towns, cities, bridges in its own or anybody's zone, and was thoroughly sworn at for its efforts. Yet armor, by its very battle-field velocity, which no other ground arm possessed, confused and outran the Nazis, frequently showing up ahead of, and cutting off, a rapidly retreating German unit. It has been said that high level plans called for American units to reach the Meuse River on D+390. An armored division hit it on D+86, and had to wait nineteen days for gasoline, tracks, bogies and other supplies. Unusual? No! Poor planning? No! Just the "Sunday Punch!" The punch that

"Softening up" a town. (Signal Corps photo.)

Armor-infantry cooperation. (Signal Corps photo.)

landed in the right place at the right time. The punch that had the ability to take advantage of the enemy's opening, and land hard and fast to send him reeling "against the ropes."

Across the Rhine, fluidity opened up an armor field day. The essential armored fundamentals, *mobility*, plus *fire-power*, plus *shock* still paid off. Armored commanders from division down, lived "surrounded" and cut off from their trains and following infantry. They learned that continued attack and advance prevented concerted Nazi action against any part of the column. Tanks rolled into Nazi artillery battalion areas, caught them busily engaged in emplacing guns. They pushed into Nazi division and corps headquarters, service parks, dumps of all supply classes and pulled up their own trains, field hospital platoons and service elements well into the combat zone for protection.

Employment of armor varied with conditions of weather, roads, terrain; and with the "idea" of the senior commander with whom the armored units worked. With most commanders it was used as a weapon or arm of opportunity. They had vision and a quick appreciation of time, space, and the situation. They grasped the capabilities of armor's *shielded power* to get the most out of it. True, they pushed it over and through the mountains of

Thuringia, over third to fifth class roads and gave it missions no armored text ever dreamed of. Somehow, it produced results, and let "grousing" drown in the road of battle.

It fought generally in mass, though it could and did split up and fight even in units of single tanks in both major theaters. Necessity, the situation, and a desire to "back up the doughboy" similarly faced with Nazi tactics, furnished a logical reason. This feature further clinched infantry-armor cohesion and mutual respect. The tanker saw a mud-plastered weary infantryman living and fighting under worse conditions of shelter and protection than himself. The doughboy saw a greasy coot, every bit as cocky as a paratrooper, who'd mix with him, heat his C-ration on the tank engine, and share it with him, and fight any "kraut" armor that came at him. This system was *intended* early in 1942, but it did not develop until later during combat in Africa, the ETO and the Pacific. It developed the "hard way."

Armor moving toward the Rhine. (Signal Corps photo.)

Tankers hated defensive operations such as covering bridgeheads, blocking areas, seizing and holding. They were all the same—headaches. A standing tank was easy prey for a *panzerfaust* team. Armored infantrymen were too few to hold long fronts and also protect tanks at night. Tank crews had to be alert twenty-four hours a day, at times for twenty days or more. But the tanker took it on the nose, and "sweated out" the time to move, to fight, to strike and roll on. Here

too, the tanker learned that the offensive attitude while on the defensive was desirable to keep the enemy off balance, but it cost tanks and men, neither of which could be replaced.

Air and armor seemed to have similar broad vision with respect to time and space. P-47s appeared over our armor at Lorient in Brittany one day. The last the armor had seen of air support was in Normandy. It was a most welcome sight to the tankers. Somehow, the plane was a contact between the armored unit and other American troops eighty miles behind. Tankers would often take off into no man's land with or without orders to snatch parachuting American pilots out of enemy territory. Once back in tankers' hands it was problematical whether the rescue was good for health and discipline. The tanker promptly gave the pilots every "P-38" (a German pistol) and ground souvenir he had, including his liquor, and then did the pilot out of his fur-lined boots and jacket. P-47's saved many an armored unit by entering an unequal scrap with a screaming dive, cutting loose a bomb-blast and a vicious .50-caliber follow-up that shook the enemy, jarred his armor and dealt death and destruction to his supporting column coming up behind his tanks. Fighter-bombers "paid the rent." They were "tops."

Armor moved rapidly. One combat command left Lorient, Brittany, and joined its parent division near Vendome, France, covering 264 miles in thirty-four hours! Engineer, medical, ordnance, quartermaster and other service elements swore, tore their hair, and then caught up with their services and supplies. All were in bivouac six hours after the combat elements closed, bringing with them all disabled vehicles. The services' early ideas of cushy billets, parks, dumps, warehouses, and semi-permanent hospitals were gone. They too worked half-packed and half-fed, ready to roll and ready to work. Their maps grew longer and bigger. They kept in touch with the situation, trying mentally to set up their installations far beyond the line of contact. The combat elements had a soft spot in their hearts for them too. The services, in the tankers' language, "Git in my hair. 'Taint sense to see 'em up here, but they brought my chow, and a letter, and they're OK for my money."

Armor turned in some fine records during World War II in organization, training and battle. Like the weapon of opportunity as it was generally used, it faded rapidly when the opportunity ceased to exist. It has now even lost its identity; it is now "Armored Cavalry,"—whether armor mounted the horse or the horse mounted the armor is the $64 question. One of the two needed transportation, maybe both! But let us not forget what armor accomplished in World War II, and what we may look forward to if and when the Armored Cavalry takes the field against any enemy which again threatens our nation. And above all, let us maintain that teamwork which was built so expensively on the battlefield.

Information, Please!

Lieutenant Colonel Herman W. Dammer, *Infantry*
Instructor, Command and General Staff College

"WILL French forces oppose the landing of Allied troops in Algeria and Morocco? If not, can they be expected to assist us against Axis forces?"

"What is the strength, composition and disposition of Japanese troops on Bougainville?"

"During what portion of May, June or July will weather favor amphibious operations against the Normandy coast?"

"What is the condition of roads and bridges between Arlon and Bastogne?"

What are these? They are obviously questions which might have been posed by various commanders at certain critical periods prior to important operations during the last war. With some knowledge of the important campaigns of the war you can tell why the information required was important to the commander.

These questions are known to commanders and to intelligence officers as Essential Elements of Information (EEI). On the answers to these questions hinged not only the effectiveness of the planning prior to operations, but also the execution of those plans.

Although identification of the questions as historic EEI is not difficult, the doctrine behind them is by no means generally understood. Too frequently the average army officer is vague on the details of intelligence work in general, and EEI in particular.

Essential elements of information may be defined as questions which express the commander's requirements for the information he needs in order to make a sound decision, formulate the details of a plan, avoid surprise, or conduct a maneuver as the situation may require.

Fundamental doctrine requires a commander faced with any operational problem to make an estimate of the situation before arriving at a decision. In doing this, the commander must take into account the enemy situation and the lines of action open to the enemy. This information is provided in the intelligence estimate; however, the several courses of enemy action stated in the estimate will, in themselves, stimulate questions in the mind of the commander. If the intelligence on hand is insufficient or too general to enable him to make a decision offering the best chances of success, the commander's questions will concern other and more detailed information that he requires. If the intelligence does enable him to make the current decision, the commander doubtless will still find that his knowledge of the situation and the enemy capabilities is insufficient to govern the future conduct of his unit. Seldom, if ever, is the enemy situation so clear, or are the lines of action open to the enemy so limited, that the commander is able to proceed with his own plans with no questions in mind. The expert commander will continually be thinking in terms of the enemy reaction to his own line of action. He will also be thinking of the next phase and of the next decision which will be required of him.

The responsibility for making weighty decisions is one which can never be delegated to someone else. Granting that the commander is the best qualified person in the command to make decisions, it follows that he is best qualified to indicate the information needed to make them. Thus, it should be clear that the designation of the EEI is the duty of the commander. The intelligence officer, of course, must render advice and assistance.

Just how does the commander indicate this required information? Is it in the formal language of the manuals? Perhaps, but not necessarily. Neither does he necessarily follow the exact wording of a formal estimate in arriving at a decision, nor does he necessarily outline his plan of operation as it will finally appear in the operations order. Such details should not trouble the military student, but it is important to remember that a commander, having reached a decision, or having made an estimate, should announce in clear and unmistakable terms, the information he considers essential.

Assuming, then, that a commander makes his needs for information known, what should be done to obtain this information? Before considering this question, a brief review of how the intelligence officer accomplishes his job may be in order.

The operation of combat intelligence is characterized by four major features: collection, processing, use and direction. Collection of information is accomplished by troops and other collection agencies as a result of proper training, provisions in standard operating procedures and directives issued by the intelligence officer. Processing of raw information into intelligence involves collation, evaluation and interpretation, and is accomplished under the immediate supervision of the intelligence officer. Intelligence is used by incorporating it into the estimate and by including it in reports for dissemination to appropriate units. The last feature, direction of the collection effort, is what we are particularly concerned with. It is by this means that the attention and efforts of collecting agencies are concentrated on the explicit enemy information which the commander desires when making decisions and formulating details of a plan of operations. This is over and above the normal and continuing collection of enemy information which any well-trained unit will effect as a matter of routine.

The determination of EEI should follow the commander's estimate. In operations, of course, the commander will frequently have to proceed with his plans with whatever intelligence is available at the time. He cannot wait until all aspects of the enemy situation are revealed to him. Nevertheless, there will always be questions in his mind concerning the enemy, the answers to which will promote the achievement of his ends.

In announcing the EEI, he, in effect, directs the procurement of that specific information which he wants. The intelligence officer then has to give to collecting agencies the necessary instructions for the collection of this information.

On examining EEI as they might be announced by the commander, and as they might appear in an intelligence or operations publications, one of the EEI might look like this: "Will the enemy reinforce his 13th Infantry Division now on the high ground south of Boomtown before 25 June?"

The frequent reaction of subordinate commanders to this is: "So what? How should I know?"

It must be repeated here, then, that in the EEI, the commander states, in broad terms, the information he desires to keep him abreast of the situation. The intelligence officer in turn will analyze the EEI to determine the specific items of information which may serve as clues in answering the question. The EEI itself is not a directive to units to collect information. It is included in various operations and intelligence publications to familiar-

ize all concerned with the broad nature of the information which is desired, and to help the lower units to appreciate the part that they play in furnishing information which enables the commander to function intelligently. The specific items will appear as specific directives.

Before going on to the analysis of the EEI as it is accomplished in the intelligence plan, let us take up the actual formulation or expression of EEI. Just what should we include and exclude and how should the material be stated?

Since by definition EEI have to do with information of the enemy and the area of operations which the commander needs in order to continue to make sound decisions, formulate details of a plan of operations, conduct a maneuver, or avoid surprise, it appears that we can develop certain guides which will assist us in deciding just what to include. Having in mind the mission, the decision and plan of the commander (if such has been formulated), the following questions, based largely on the above definition, will lead us to the EEI for a given situation:

a. What enemy line of action will most seriously affect the accomplishment of our mission or plan?

b. What is the next major decision which can be foreseen at this time, and what information do we require to make it?

c. What information is required to prevent surprise to the commander?

d. What information of the enemy, terrain or weather is required in order to plan future maneuvers?

e. What information pertaining to our situation has been requested by higher or adjacent units?

A study of the situation and the application of these questions will lead us to the material to be included in our EEI. But where do we stop, what do we exclude, where do we limit ourselves? The answer to this can only be determined when dealing with an actual situation. EEI should only point up the particular information required over and above the information which is normally collected.

It is often found that essential elements of information are expressed in stereotyped terms. A pedantic or trite form is as undesirable in intelligence work as in any other, and any means the intelligence officer can devise to keep his material alive and realistic will help in producing better results.

The EEI having been determined, immediate steps must be taken to secure the answer to them. A specific intelligence plan is formulated, and then directives and requests are transmitted to collection agencies.

This brings us to a discussion of just what this analysis of the EEI included in the plan is, and how it is accomplished. The analytical process is to determine what steps the enemy would have to take in order to bring about the line of action under investigation. These separate steps are known as indications. Broad tactical lines of action, such as attack, defense, withdrawal, and reinforcement can be analytically broken down into their separate component actions. For a ground attack, for instance, a unit must move from one location to the vicinity of the contemplated action, it may go into assembly areas, install new supply or evacuation points, intensify its reconnaissance, displace its artillery forward, etc. Each is an indication of attack.

Field Manual 30-5 provides such a list of common indications for various lines of action. In actual operations, however, the alert G-2 will revise these indications as his experience with a real enemy discloses certain operational characteristics or peculiarities.

It should be noted that no one of these indications in itself constitutes conclusive proof of the enemy's intention to adopt the line of action under consideration. Each item, however, furnishes a clue which strengthens the probability of adop-

tion of a capability which had previously been determined to be open to the enemy. It is only when many of these clues are assembled, evaluated and interpreted that the intelligence officer is justified in eliminating certain enemy capabilities.

After the analytical breakdown of an EEI into indications, the next step by the intelligence officer is to apply the indications to the situation. This is done by the formulation of a collection scheme wherein each indication in turn is applied to the map and the known dispositions of the enemy. The result desired from this process is that the intelligence officer will be able to determine exactly what he wants looked for or done, by whom it is to be done, and when the job is to be accomplished. He then issues specific directives and requests for the collection of information.

It should now be apparent that EEI are merely the guides on which the collection of information is based and are not in themselves directives to subordinate units. Actually, the directives and requests for information sent to lower, higher, and adjacent units have little or no resemblance to the EEI, although these directives are the result of the analysis of EEI. As information is received as a result of directives and requests, the G-2 is able to get the answers to what the enemy *is* doing and what he *is not* doing. In this way, he can narrow down the enemy's scope of action by eliminating courses which are no longer physical capabilities, and thus give the commander a clearer, more particularized, picture of the enemy situation on which to base his plans and decisions.

It should be noted that the "Direction of the Collection Effort" feature of combat intelligence comprises three procedures: The determination of what information is required at a particular time (determination of the EEI), the analysis of the EEI and the preparation of a collection scheme (formulation of the specific intelligence plan), and the transmittal of specific directives and requests to collecting agencies. By the proper utilization of his intelligence agencies at this time, the commander discharges his responsibility for initiating the search for information which he must have in order to continue to function on a sound basis, and the intelligence officer accomplishes his job of obtaining information and keeping his commander informed of the situation.

In operations, our "Information, Please" does not pay off in encyclopedias; but, rather, in success in battle. When all other factors are equal, and frequently even when the situation favors the enemy, the difference between winning and losing may very well stem from the energetic implementation of that major feature of intelligence operations known as the "direction of the collection effort."

The mood of an international conference, the outcome of a test tube experiment, the discovery of a mineral lode, even the abundance of an annual harvest—each of these has its impact on our security in a world where isolation is impossible.

General of the Army Dwight D. Eisenhower

Control of Army Patient Traffic *in the* Zone of Interior

Lieutenant Colonel James T. McGibony, *Medical Corps*

BETWEEN December 1941 and July 1946, more than half a million sick and wounded army personnel returned from overseas theaters for further hospitalization in the Zone of Interior. These patients were returned by troop transports, by hospital ships and planes. The method of evacuation depended upon available facilities and the circumstances concerned, as some patients needed rapid evacuation while others could use slower transportation without deleterious effect upon their condition.

In the late fall of 1944, rapid acceleration of evacuations began in anticipation of an early victory in Europe. The evacuation policy was reduced from 120 days to ninety days, and then to sixty days in order to have as many medical installations in Europe available for deployment to the Pacific as possible. This meant that every patient coming into a hospital in the European Theater who, upon examination, was found to require more than sixty days hospitalization, would be set up for evacuation to the United States.

The results of this accelerated evacuation can best be demonstrated by the fact that total overseas evacuees arriving in the ZI in November 1944, totaled 19,000; in December 1944, the total went up to 32,000; in January 1945, the figure reached 33,000, and increased each month until it reached a peak of more than 57,000 during May 1945. Total evacuations for this month alone were enough to fill thirty 2,000 bed general hospitals! After May 1945, the evacuations declined quite rapidly from 45,000 in June to 8,000 in December 1945. By 1 August 1945, all transportable battle casualties had left Europe and by December 1945—four months after VJ-day—all transportable battle casualties were out of the Pacific.

The Army had twenty-seven hospital ships in operation at the peak of operations. These ships, the returning transports, and the planes made available by the Armed Forces were, at times, delivering patients to the Zone of Interior in such numbers that an unprecedented test was placed upon the system that had been established to control the patient traffic.

Set up to handle the responsibilities of The Surgeon General for control of patient traffic was the Medical Regulating Office of the Hospital Division. The functions of this office as established by the War Department were:

1. Assure efficient utilization of available hospital beds; maximum use of transportation facilities; initiate or coordinate, as appropriate, necessary instructions to accomplish these.

2. Inform post commanders or commanders of debarkation hospitals how, when, and where they would route returning overseas patients.

3. Receive, direct, and act on requests for transfers of patients to, from, or between medical installations.

4. Maintain a daily record of available

beds in such hospitals as necessary to insure proper control of flow of patients.

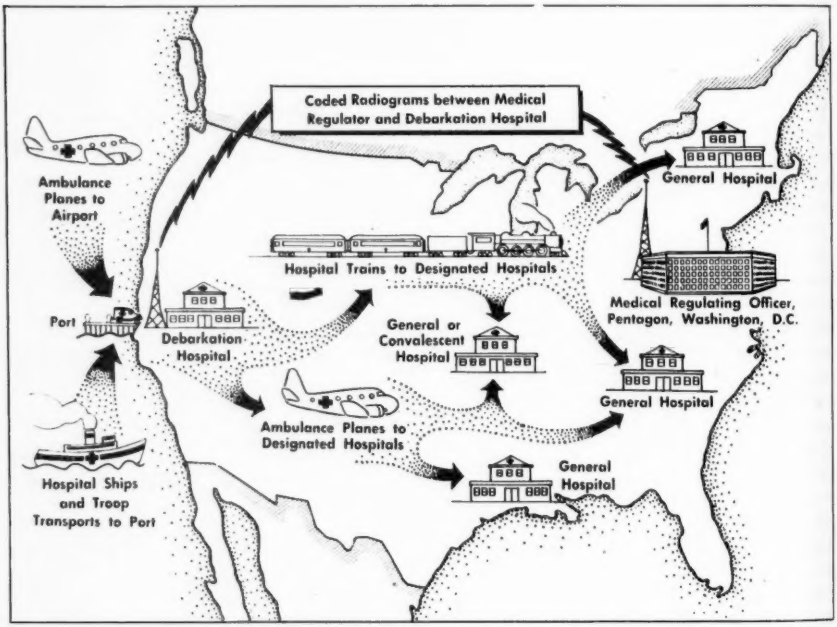
5. Maintain liaison with the appropriate agencies to secure information concerning patients enroute to the U.S., the Medical classification of these patients and their expected time and port of arrival.

6. Maintain liaison with the appropriate agencies to insure the availability of transportation (air or rail) for movement of patients within the United States.

7. Coordinate or initiate instructions regarding the use and administration of hospital teams to insure maximum efficiency in the use of equipment, supplies, and personnel.

During the war, the Air Surgeon had a regulating officer on duty in his office, and all air movement of patients was coordinated between that office and the Medical Regulating Office of The Surgeon General's Office.

Due to the close liaison necessary between the Medical Regulating Office and the Transportation Corps, which was handling and coordinating all ship and train movements, the office of the Medical Regulating Officer was physically established in the vicinity of the Chief of Transportation's Office early in the war. Here he could conveniently and efficiently keep himself informed on all transportation handled by the Transportation Corps, and at the same time be in close proximity to the Army Air Forces Headquarters for air movement coordination.


Coded Radiograms between Medical Regulator and Debarkation Hospital
Ambulance Planes to Airport
General Hospital
Hospital Trains to Designated Hospitals
Medical Regulating Officer, Pentagon, Washington, D.C.
Port
Debarkation Hospital
General or Convalescent Hospital
General Hospital
Ambulance Planes to Designated Hospitals
General Hospital
Hospital Ships and Troop Transports to Port

Distribution of Overseas Evacuees to Army Hospitals.

To accommodate the evacuee load at its peak, debarkation facilities were established to handle patients on ships arriving at the respective ports as follows:

Boston: Station Hospitals, Camp Miles Standish and Camp Edwards.

New York: Halloran General Hospital; Mason General Hospital; Station Hospitals, Camp Kilmer and Camp Shanks.

Hampton Roads: Station Hospital, Camp Patrick Henry, Va.

Charleston: Stark General Hospital.

New Orleans: La Garde General Hospital.

Los Angeles: Birmingham General Hospital; Station Hospital, Camp Haan, Calif.

San Francisco: Letterman General Hospital.

Seattle: Madigan General Hospital.

Air debarkation hospitals at appropriate air fields were established by the Army Air Forces.

Patients arriving at the Ports of Debarkation were taken to the hospital designated for handling such patients and were given physical examinations and such treatment as was necessary following their voyage. This was their first chance to put in a telephone call to relatives and to feel they were actually back in the good old U.S.A. By means of a special code system, the Medical Regulating Officer received notification from the debarkation hospital as to the number of patients, their diagnoses, and the section of the U.S. in which they resided. The named general hospitals had been designated for treatment of specialized cases. Certain general hospitals handled amputation cases, others specialized in neuro-surgery, general medicine, tropical medicine, and on down the list of specialties. By this arrangement, qualified medical personnel could be concentrated and the patients transferred to the appropriate hospitals. The Medical Regulating Office, since it was a branch of the Hospital Division, S.G.O. always had available the list of hospitals with their specialties, bed capacities, total patient census, and number of available beds. By contact with the Transportation Corps and the Army Air Forces, the Medical Regulating Officer also knew what transportation was available for getting the patient to the correct hospital. From examination of these data and the data received from the debarkation hospital concerning the patients, he could send information back to the debarkation hospital immediately as to where the patients were to go, when they were to leave, and how they were to travel. Every effort was made to place the patient in the hospital nearest his home that had available specialty beds for the particular condition. However, since the geographic distribution of the general hospitals did not correspond to the population density of the various sections of the country, such an arrangement became extremely difficult at the peak of operations, since available beds anywhere were scarce.

In addition to the planes made available by the Army Air Forces for rapid evacuation to the hospitals scattered over the country, and the regular Pullman cars, the Army had available at peak evacuation operation 320 ward and unit hospital cars and sixty Medical Department kitchen cars. These cars were strategically based at Camp Miles Standish, Massachusetts; Arlington yards, Staten Island, New York; Hampton Roads, Virginia; Stark General Hospital, Charleston, South Carolina; Camp Haan, California; Crissy Field, Presidio of San Francisco, California; and Madigan General Hospital, Fort Lewis, Washington. From these locations, the cars could serve the various debarkation hospitals quickly and efficiently. Assigned to each hospital train unit were a group of officers, members of the Army Nurse Corps, enlisted personnel, Red Cross representatives, and civilian employees who looked after all details of transportation, feeding and care of the patients. Provisions were made for religious services, recreational diversions and special comforts for the patients while enroute—among them cigarettes, candy, reading

material, and musical instruments. The peak was reached in the use of army owned rail facilities for the transportation of sick and wounded in June 1945, when the ward and unit cars traveled a total of over two million miles.

The established regulating system withstood the unusual tests placed upon it, and returning patients—whether amputees from Normandy, trench foot patients from Italy, malaria patients from the Pacific, neurosurgical patients from Alaska or Panama—were examined, coded and routed to various specialty centers without serious interruptions of treatment.

The successful evacuation of a patient from an overseas theater to the named general, or convalescent hospital in the United States where definitive treatment was to be furnished required the coordinated efforts of many groups. The Transportation Corps, the Air Corps, the Navy, the various port officials, railroad authorities, commercial air lines, and all others concerned, by their untiring efforts and whole-hearted cooperation with the Medical Department enabled the patient, the necessary medical personnel, and hospital facilities to be brought together in the most expeditious manner.

There are some significant differences in the employment of the medical profession in World War II and in previous wars. The most notable is that in World War II the humanitarian aspects of medicine were subordinated in a great measure to military uses, and new medical discoveries and advances kept secret so as to deny them to nations at war with us or considered unfriendly to us. This is a complete reversal of the ethical current which from the time of Hippocrates has continued in one direction only, namely toward the relief of human suffering without reference to national, racial or social differences. It is remarkable that there is nowhere to be found any opposition to this use of the medical profession though it constitutes an employment counter to the age-old ethical concepts of medicine and at variance with its long-expressed ideals.

The second most important change was the introduction of an entirely new weapon with entirely new medical and surgical effects, namely, the atomic bomb. Just as in World War I, gas warfare was the most remarkable new weapon, inflicting unusual wounds, so in this war the atomic bomb produced a new type of casualty. Not since the use of gunpowder has there been so revolutionary a weapon introduced into warfare, producing unusual wounds and medical problems.

A third feature of this war in which it differed from previous wars was the greater employment of complex mechanical weapons of all sorts, as a consequence of which there was a very high proportion of casualties among our own forces due to the operation of these weapons in training and in the movement of military forces by high speed transportation methods.

United States Naval Medical Bulletin

MILITARY NOTES AROUND THE WORLD

GERMANY

Novel Helicopter

A hovering helicopter, to be used as a radio signaling and observation station, was developed in Germany late in World War II. It was powered, both for lift and signaling, through cables from portable ground generators.

The device was never used in warfare, but had been air-tested several times. It had been successfully flown for thirty minutes at about 2,500 feet, and several times at lower altitudes.

Four trucks were used to transport the apparatus. One carried the helicopter, three carried electric generators and winches with the necessary cable. As the helicopter rose in the air, the winches payed out the cables from three separated positions, with equalized tension, fast enough to permit an ascent to 2,000 feet in about seven minutes. A 2,000-volt current to operate the 200-horsepower lifting motor was carried by one cable, and a 30,000-volt high frequency current for radio transmission was carried by another.—*Science Service.*

CANADA

GCA *Equipment*

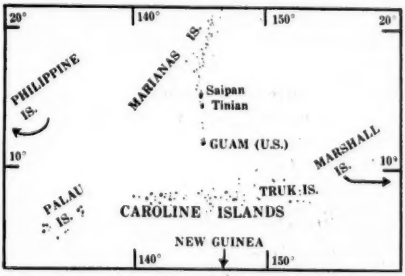
Ground Control Approach (GCA) equipment is being installed on a number of Canadian airfields. Two of the fields selected are in Manitoba, at Rivers, and at Churchill. Another is at Patricia Bay in the west, and three eastern region airports will also get the equipment.—*Canadian Aviation.*

JAPAN

Japanese Fortifications

Seven Japanese defense witnesses at the International War Crimes trial have testified that no military installations or fortifications existed on Palau, Truk, Saipan, Tinian, and other mandated islands prior to the outbreak of war.

Captain Hidemi Yoshida, who served in the Japanese Navy Ministry from 1941 to 1945 said that while Japan regarded the mandated islands as "a first line of defense," no military installations on them were ordered prior to November 1941, due



Japanese witnesses claim these bases were not fortified prior to the outbreak of war.

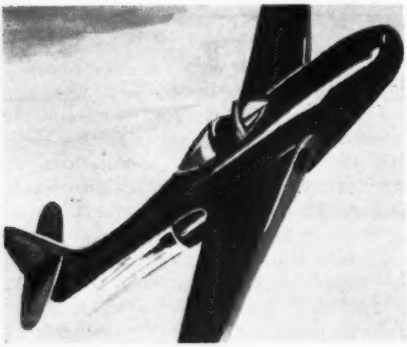
to prohibitions of the League of Nations mandate. He admitted that studies had been made and plans prepared for such installations for use in time of war, although the first order for construction was not issued until 5 November 1941.

At the outbreak of war, the witness said, there were not enough fuel storage facilities in the islands to accommodate the Japanese fleet.—Associated Press.

USSR

Jet Fighter

This is a photograph of a Soviet fighter plane equipped with a jet engine. The air intakes are located at the base of the wings. The engine is mounted under the fuselage. The plane has a single seat,



Soviet jet fighter as pictured in a Polish publication.

cut midway by, and suspended in, the slight "V" of the wings.

Soviet sources give the speed as 950-1,000 kilometers per hour. The fighter is able to remain aloft about two hours.—*Skrzydlata Polska.*

Demobilization

Demobilization is taking place, according to several decrees published by the Ministry of the Armed Forces, and has probably reached the 1942 age class. At the same time conscription, in accordance with Soviet law, is in force. The present size of the Air Force is not known but in view of Russia's heavy occupational commitments and her vast frontiers, it is thought that she will maintain a substantial and modern service, and she is known still to have considerable numbers of aircraft in occupied Europe.—*Journal Royal United Service Institution.*

SWEDEN

Arctic Climate Changes

Since 1900, Arctic air temperatures have increased ten degrees, a fact of world strategic importance, according to Dr. Hans Ahlmann, Professor of Geography at the University of Stockholm, and director of the Swedish Geographical Institute. In the same period, ocean waters in the strategic Spitzbergen areas have risen three to five degrees. One effect of this change has been to improve navigation conditions. The navigable season along the western part of Spitzbergen was only three months in 1910, but now lasts eight months a year.—*Science Digest.*

IRAQ

Air Force

The Royal Iraqi Air Force, although organized on RAF lines, is an integral part of the Army, and its Commanding Officer is directly responsible to the Iraqi Chief of General Staff.

Attached to the RIAF is a RAF Wing Commander Inspector who has a staff of RAF officers and NCOs employed as instructors. These form part of the British Military Mission to Iraq.

It is at present organized into four squadrons—Nos. 1 and 7 (GP) Squadrons, No. 4 (F/B) Squadron and a training squadron. A Flying Training School and an Apprentices School existed at Moascar al Rashid.

The Iraqi Government have recently ordered thirty-four Hawker Fury fighters. Four are to be converted to two-seater dual-control trainers. The single-seater type, to be known as Fury "Baghdad," will be equipped to carry various external loads, e.g., two 1,000-lb bombs, combinations of bombs, drop-tanks and smoke installations. Equipment is also being provided for operating as a long-range photo-reconnaissance fighter. — *Journal Royal United Service Institution.*

ARGENTINA

Aviation Five-Year Plan

Argentina is faced with a situation that will require serious effort if the country is to occupy the place in aviation to which it aspires. Hence the five-year plan covers a wide field in both civil and military aviation. After showing that air power is one of the essential factors of a nation's security, the plan deals with the advantages of developing commercial aviation.

Above all, Argentina desires to free herself from the necessity of importing equipment. At present she cannot think of building up air fleets with her own means to meet the requirements of the five-year plan which include capacity to defend her soil and to occupy a firm position in international air traffic.

The first objective is to establish an aviation industry on a scale commensurate with the future air strength of the nation. To this end, the government is ready to grant large subsidies to private industry, reserving the right to direct it toward a firm basis. Specially trained foreign workers will be employed.

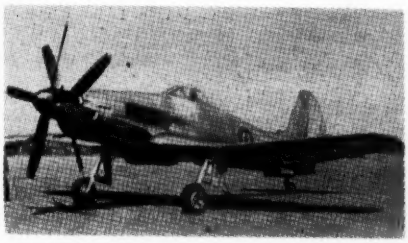
As for commercial aviation, the minimum objective is double that planned in 1944. Personnel must be recruited largely from the nation's military aviation, which represents an abundant source of specialists. As for military aviation, the plan prescribes a development that will enable it to fulfill its missions. In addition, the Argentine meteorological service will be expanded and closely connected with aviation.

The plan reflects the ambition of Argentina to become a great air power. For several years she must turn to the outside world for assistance, but the aims of the five-year plan are ambitious and if attained will insure Argentina an independence in air power that it has heretofore lacked.—*Forces Aeriennes Françaises.*

GREAT BRITAIN

Westland Wyvern

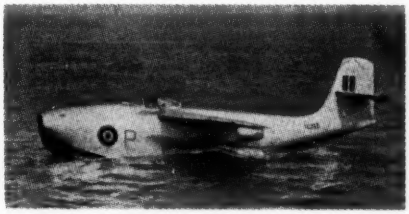
The new British Westland Wyvern plane for carrier use is powered by a 24-cylinder, 3,500 horsepower Rolls-Royce Eagle engine. It is fitted with two



contra-rotating, four-bladed propellers. The plane carries a military load of 2,000 pounds, and has a top speed of 450 miles per hour.—News reports.

Flying-boat Fighter

An unusual development in the field of British aviation is the Saunders-Roe A.1 jet-propelled flying-boat fighter. It has two Metrovick Beryl axial-flow turbines of 3,300 pounds static thrust each, and is



rated at about 500 mph. Landing speed is about 100 mph, and it becomes airborne in eleven seconds. Dimensions are: span, 46 ft; length, 50 ft; height, 17 ft; hull beam, 6.83 ft.—*The Aeroplane.*

ETHIOPIA

Air Force Reorganized

Reorganization of the Ethiopian Air Force is being undertaken by Swedish Air Force officers. Much of the new equipment is Swedish built, and includes such planes as the Saab-91 Safir, low-wing three-seat communication monoplane, and the Avro XIX.—*The Aeroplane Spotter.*

Swedish Saab Safir, similar to those recently sold to Ethiopia. This model is fitted with floats but the standard plane has retractable landing gear.

SWITZERLAND

Military Organization

In connection with the revision of the federal law concerning military organization, a commission of the national council which was handling this matter recommended that the same powers enjoyed by the other members of the National Defense Commission be granted the commander and ordnance chief of the air and antiaircraft defense forces.

The national council approved this recommendation by the vote of eighty-seven members, while only twenty-seven votes were given the motion of the supreme executive council which would have granted only advisory powers to the commander and ordnance chief of the air and antiaircraft defense forces. Previously they have had only consultant powers on the National Defense Commission.—*Flugwehr und -Technik.*

INDIA

Gurkha Troops

The famous Gurkha troops from the kingdom of Nepal have been split between Britain and the Dominion of India in the recent division of Indian armed forces. Gurkha battalions in Pakistan areas were to be moved into India, and those overseas remain under the supreme commander who temporarily heads the forces of both Dominions. Both India and Britain were expected to send missions to Nepal to negotiate with the Nepalese government on conditions of service of the Gurkhas.—*The New York Times.*

AUSTRALIA

Post-War Air Force

Australia's post-war air force provides a nucleus around which a powerful air group could be built in an emergency. The organization has been planned to meet rapid expansion. Besides aircraft in use, others are kept in two stages of reserve with a program of maintenance to prevent deterioration. In addition to training duties, the air force is scheduled to be used for observation and maintenance work on the new rocket range in Central Australia and for photographic survey of the Commonwealth. There are also cooperative projects planned with other defense forces, the Council for Scientific and Industrial Research, and State Agricultural authorities.—*Australian News Summary.*

Uranium Deposits

The Commonwealth Government will control all uranium deposits in Australia to protect the interests of the nation. An Atomic Energy Act was passed by the Federal Parliment in August 1946, which declared that all Uranium, thorium, plutonium, or other substance which might be used for the production of atomic energy was the property of the Commonwealth.—*Australian News Summary.*

UNITED STATES

Scientist Survey

A survey conducted by the American Chemical Society in conjunction with the War Department Research and Development Division, indicates that the armed services in World War II did not make full use of the nation's scientifically-trained manpower. As a result, the Army expects to revise its classification system so as to place trained scientists in positions suitable to their educational and practical backgrounds.

The survey showed that of the younger chemists in the military service, about 47 per cent considered their scientific know-how to have been used only a small part of the time or not at all. Older scientists who served in uniform, however, found their talents to have been used adequately in war work in 75 per cent of the cases.—*War Department.**

New E Ration

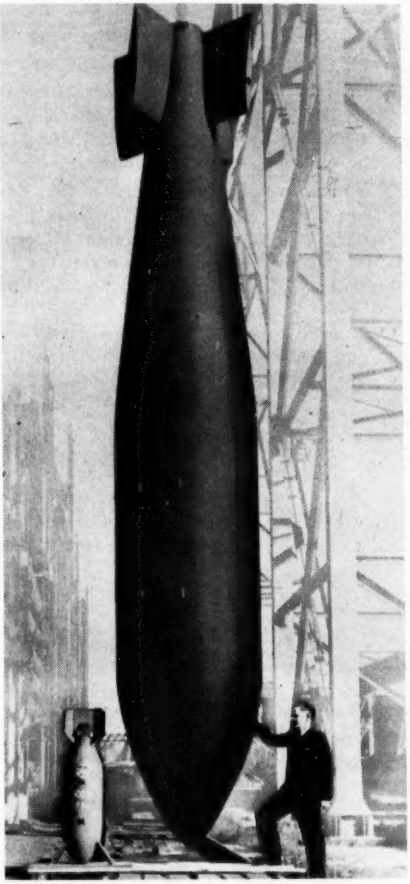
The new E ration is being submitted to a gruelling test for stability. Packages of the rations have been stacked at Camp McCoy, Wisconsin, and at Fairbanks and Adak, Alaska, where they will remain for two years, exposed to the rigors of the weather in some of the most extremely dry-cold and wet-cold climates on earth. The ration packages so tested will be disposed under various conditions, all out of doors.

The new E ration, which is intended to replace the old K and C rations of World War II, has proved in field tests to be greatly superior to the older types. Troops engaged in mountain-climbing exercises have subsisted on the new E ration for thirty days continuously without losing weight or vigor, and have not tired of the components. Now it will be learned whether the ration components will retain their purity and texture for two years under the most adverse climatic conditions.—*The Quartermaster Review.*

* Released prior to reorganization.

42,000 Pound Bomb

About twice as large as any bomb dropped during World War II is the 42,000-lb bomb developed by Army Ordnance in 1945. The AF has modified a B-29 Super-

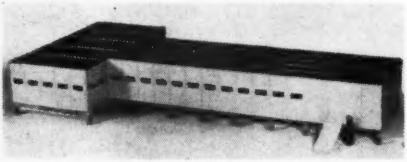


fortress to carry the bomb, which has been scheduled for testing. The 500-lb bomb on the left, and the man on the right, give a basis of comparison with this giant explosive.—Signal Corps photo.

Arctic Troop Shelter

A prefabricated temporary Arctic shelter for troops, capable of providing an interior temperature of 70° Fahrenheit while the outside thermometer registers 70° below zero and also capable of withstanding the impact of a 125-mile-an-hour wind, is being designed by the Corps of Engineers. Present plans call for a building light enough in weight to be transported by airplane or glider and so simple in construction that it can be erected quickly by unskilled men wearing Arctic clothing, including gloves.

To meet weight requirements, the Engineers are using aluminum in their preliminary plans, although design is such as to permit use of other materials if necessary. They are preparing to con-



struct building units 8 x 20 x 9 feet. This unit is capable of being expanded in two directions to any size without using special connecting devices. No vertical expansion is contemplated. Panels composed of two thin sheets of aluminum with insulation between, and 8 x 4 feet in size, will be used for walls, flooring and roof. They will be interchangeable, and will require no paint or similar protection.—*The Military Engineer.*

"Lost and Found"

Since December 1942, the Army Effects Bureau operated by the Office of the Quartermaster General has returned to the proper owners more than $8,000,000 in personal funds lost by Army personnel or found among the effects of deceased soldiers.—*Army Times.*

Artificial Moonlight

Lighting of combat areas by searchlight beams was first used by the British Eighth Army in Italy in September 1944. It was picked up by the U.S. Army and tried in Europe and the Pacific, and the Germans employed it early in 1945.

Now the AGF Developments Section, through Board No. 3, is experimenting at Fort Benning to further develop artificial "moonlight," and determine its merits and defects in ground operations.

Artificial moonlight aids movement of vehicles, the servicing of artillery weapons, and patrolling or attacking infantry. It marks front-line boundaries for aircraft, speeds engineer road and bridge maintenance, and provides a means of signaling.

However, the beams often silhouette our own troops, permit enemy observation from flanks, cause possible loss of surprise, provide lighting of the enemy's front area, and assist enemy airmen in strafing and bombing.

Prisoners of war said that artificial moonlight was helpful to their supply systems, and shadows helped concealment. The searchlights were hard to locate and few were destroyed by the enemy.

In employing searchlight in support of ground action, the terrain should be open and preferably sloping toward the enemy. Positions defiladed from the front and sides and hiding at least 100 yards of the beam are desirable.

A solid cloud base at 500 to 5,000 feet gives the maximum reflection. Tests are being made with 800 million-candle-power beams pointed at artificially-produced clouds and artillery smoke bursts. Ground haze, fog and rain cut the effectiveness, and wind prevents cloud stability. Ice or fallen snow increase visibility.

Best results were obtained between 3,000 and 7,000 yards. Visibility falls off sharply beyond 7,000 yards.—*Armed Force.*

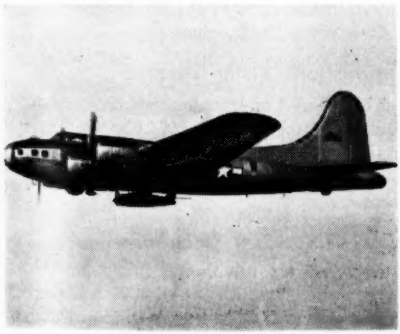
XR-12 Helicopter

The XR-12 is a five-place helicopter built for the AF by the Bell Aircraft Corporation. It has a top speed of 105 miles per hour, and an operating range speed of 90 miles per hour. It has a range of 300 miles and can climb vertically at

450 feet per minute. The service ceiling is 13,000 feet, and the hovering ceiling 4,350 feet. A useful load of 1,630 pounds can be carried.—AF photo.

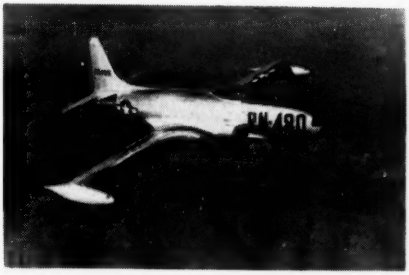
Trans-Sonic Tests

Model airplanes which reach trans-sonic speeds when dropped from a mother plane are being tested at the Naval Air Experimental Station, Philadelphia. Shown here



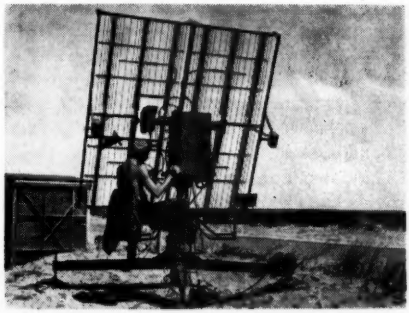
is a replica of a Navy "Bear-cat" F8F fighter being carried aloft by a PB-1W Navy Flying Fortress. Released at a high altitude, the model attains speeds of over 600 miles per hour before automatic controls pull it out of the dive and a parachute lowers it safely.—Navy photo.

AF's P-80B



Production of the new P-80B, an improved model of the P-80A, is underway at the Lockheed Aircraft Corporation. The first in-flight photograph of the P-80B is shown here.—AF photo.

Radio Direction Finder



This long-range radio direction finder unit developed by the Signal Corps is used by the AF Air Weather Service to track rawinsonde balloons which carry instruments transmitting detailed weather information to altitudes as high as 100,000 feet. By tracking the balloons, the direction finder is able to record the direction and velocity of winds at various altitudes. This set is in use at the White Sands Guided Missiles Proving Ground in New Mexico in planning the firing of test rockets.—AF photo.

Miscellaneous Notes

Japanese Balloons

American silence during the war is now credited with causing the Japanese to abandon their balloon-bomb attack. Nine thousand balloons were launched, according to Japanese sources, but because no reports were forthcoming on results, the general staff ordered the project abandoned in April 1945. Although it is estimated 1,000 balloons reached the Western Hemisphere, 283 separate recoveries of balloon materials were made, the findings ranging from small pieces of paper to a few almost intact balloons. One balloon reached as far east as Michigan, and others landed in Texas, Mexico, Alaska, and Canada, as well as in Washington and Oregon.—News reports.

AA Defense Units

Air Force air defense units throughout the country can obtain additional antiaircraft batteries from the Army Ground Forces should they be required in an emergency, under terms of an agreement effected between the AF, and the Army Ground Forces.

The joint agreement was drawn up to provide a clear definition of authority and to eliminate indecision in the utilization of antiaircraft. Certain antiaircraft units are assigned to the AF for aerial defense, while others are assigned to the AGF for field use. The agreement will prevent any confusion between AF and AGF commanders on the use of antiaircraft batteries in an emergency, and provide a standard basis for their use throughout the country's six defense areas.—War Department.*

Ice Tests

This winter, the Phantom, Navy jet-fighter, is undergoing ice-tests under natural conditions on top of Mount Washington, New Hampshire.—News reports.

Guardsmen to Schools

Approximately 2,000 National Guardsmen assigned to ground force units are expected to attend Army Ground Forces training schools during the current year.—War Department.*

Army Atomic Laboratory

An important step toward development of atomic power for industrial purposes is seen in the announcement of plans for a $20,000,000 nuclear research laboratory at Schenectady, New York. It will be the fourth institution designed to convert the power of the fissioned atom into uses beneficial to mankind. The new laboratory will have as consultants a group of leading atomic physicists who helped pioneer in the development of the atomic bomb. Among its special equipment will be a uranium reactor for producing atomic power experimentally, power atom smashers, and a "hot" chemistry laboratory for the study of reactions involving radiation from materials made radioactive by atomic power. —*The New York Times.*

Suggestions Bring Savings

The War Department estimates that it has saved more than $174,000,000 in less than four years as a result of its employee suggestion program.—War Department.*

Navy Voice-Ray Telephone

A voice-ray telephone, using infra-red rays was developed by the Navy during World War II. It has a "line-of-sight" range, the same as television, and therefore eliminates freak interception or interference by an enemy miles away. Conversations can be held between near-by ships or from ship to shore, but the invisible rays will not penetrate fog, water, or anything that stops a visible light ray.—*The New York Times.*

* Released prior to reorganization.

FOREIGN MILITARY DIGESTS

Air Operations in Greece

Digested by the MILITARY REVIEW from a report by Air Vice-Marshal J. H. D'Albiac in "The Royal Air Force Quarterly" (Great Britain) March 1947.

UNLIKE the Italians (in October 1940), the Greek forces were little prepared for war. Their regular army units were at their peace-time stations and general mobilization had not been ordered. On being attacked, the Greek units holding the frontier posts on the mountainous borders of Albania were overwhelmed in some cases by sheer weight of numbers, and compelled to give ground. This was particularly the case in regions where conditions were suitable for the employment of Italian mechanized forces. The progress of the Italian Army was slow, as it had been thought that all Italian demands would be met without resort to arms. It was confirmed also that the opening of hostilities was quite unexpected by the Italian soldiers themselves, who had been led to expect a diplomatic victory and a peaceful advance into Greek territory.

The Greek Problem

It was clear that the problem confronting the Greeks was largely one of time. Greece is badly served by communications. Roads and railways on the mainland are few in number and the former, in most cases, bad. A number of her reservists had to come from the Greek islands, and it was estimated that it would take at least three weeks for the Greek mobilization to be completed. In the meantime, the Italian Air Force could, if handled properly, play havoc with their mobilization. This, for some unaccountable reason, the Italians failed completely to do, and wasted their comparatively strong air force in abortive attacks on undefended islands and hospitals in Salonika.

The Greek Air Force

The Greek Air Force, although small and out-numbered by the Italian, fought most gallantly during this initial stage. Their pilots, many of whom had attended courses in England and elsewhere, were alert, and what they lacked in modern war technique they made up for in personal bravery. Their aircraft consisted of a number of different foreign types, French and Polish predominating, with a limited number of spares.

Operationally, the Greek Air Force was controlled by the General Staff, and was used almost entirely in direct support of their army. They were quite unable to obtain any degree of air superiority, and, in consequence, suffered severe casualties. In addition, an abnormally high proportion of unserviceability soon existed.

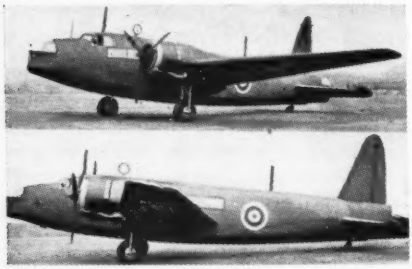
Decision to Send an RAF Contingent

In response to an urgent appeal for help, the British Government decided to send a contingent of the Royal Air Force to Greece from the Middle East. The force decided upon was two medium bomber squadrons, one mixed medium bomber and two-seater fighter squadron—all

armed with Blenheim aircraft—and two single-seater fighter squadrons armed with Gladiator aircraft. On my arrival in Athens on 6 November 1940, the advance element of this force had already arrived and were ready for action.

Air Policy

That evening I attended a conference with the Prime Minister and Commander in Chief. Every pressure was brought to bear to employ my force in the same manner as the Greek Air Force, in close support of the ground forces. I appreciated, however, that the best help I could give



Vickers "Wellington" Long-range Bomber.

the Greek Armies was to concentrate my small bomber force on the enemy's disembarkation ports in Albania and the important centers in his lines of communication. I argued that such a plan would do far more to delay his advance than if I attacked his forward elements. If, however, the situation deteriorated considerably, and a break-through occurred, I would of course devote the whole of my force to the immediate task of stemming the enemy's advance. I finally obtained agreement on this policy and attacks were directed forthwith on the enemy's back areas. These attacks were maintained at maximum intensity with the few daylight bomber aircraft at my disposal and the detachments of Wellington aircraft sent over from Egypt to operate during the periods of moonlight. By the end of November, the Italian advance had been stemmed, and the Greek forces who had by then completed their concentration were able to take the offensive.

Selection of Airdromes

One of the main difficulties was the extreme scarcity of airdromes suitable for modern aircraft. There were no all-weather airdromes, and on the mainland of Greece, there are few areas in which airdromes of any size can be made. I was forced, therefore, to concentrate my bomber force on the two airdromes in the vicinity of Athens, and station my fighter squadrons on whatever grounds I could find near the front line, where they had to operate under conditions of the gravest discomfort and difficulty.

Criticism has been made that the initial force which was sent to Greece was inadequate, and many more squadrons should have been provided. However, even if these squadrons had been available, which they were not at the time, the lack of suitable airdrome accommodation would have prevented us from accepting them.

Arrival of the Force

Units of the force continued to arrive throughout November and December, and by the end of the year the concentration was complete and the whole command functioning smoothly. When the composition of the force was being considered in the Middle East, it was decided that all the ancillary services such as hospital, works, rationing, etc., should be provided by the Army, with appropriate army officers on my headquarters staff to deal with them. This arrangement was particularly successful.

Progress of Operation

The Greeks by now had taken the offensive and had managed to drive all the Italian forces off Greek territory and in some sectors had even advanced into Al-

bania. Our continued bombing offensive against the ports of Valona and Durazzo and the focal points on the enemy's rearward system was having a serious effect on his supply organization. During moonlight periods, our bomber effort was being extended to targets on the mainland of Italy by means of Wellington aircraft detached from Egypt for the purpose, and considerable damage was being inflicted on ports on both sides of the Adriatic. Our fighter aircraft were establishing a definite atmosphere of moral, if not of numerical, superiority in this theater.

Reinforcement Plan

Early in 1941, I visited Cairo in order to discuss the question of reinforcement which was then under revision. Operations in the Western Desert were being brought to a successful conclusion and it was hoped that by the time the weather conditions had improved in Greece so as to allow occupation of more airdromes, it would be possible to spare additional squadrons from the Middle East Command. The reinforcement plan envisaged a total force in Greece of fourteen squadrons, and I intimated that I would be prepared to start accepting the additional squadrons by 15 January. It was hoped that the whole program would be completed by 15 April. In planning the reinforcement program, I again endeavored to get permission to use the airdromes in the Salonika area, some of which had remained generally serviceable throughout the winter and could be occupied forthwith. The Germans, however, had commenced their infiltration into Romania, and the Greek Government was particularly anxious to avoid giving them any idea that we had any hostile intentions in Macedonia which could be directed only against German interests.

The Greek Air Force

The Greek Air Force had suffered severe casualties in the early stages of the war, and by the end of the year it was reduced to a mere token force of a few serviceable operational aircraft. Promises of the provision of modern fighter aircraft had been received from the US, and the British Government had agreed to supply aircraft as and when they became available. While admiring the *esprit de corps* and enthusiasm of the officers and airmen of the Greek Air Force, I considered that operationally they had a lot to learn before they would get full value out of really modern aircraft. Similarly, from the maintenance point of view, a considerable amount of reorganization was necessary before they would be able to maintain a reasonable degree of serviceability. I had previously discussed the whole problem with the King of Greece and the Prime Minister and had suggested that a British Mission should be appointed to help them in the reconstruction of their flying service. They welcomed the suggestion, and the work of reorganizing the Greek Air Force on modern lines was commenced.

Offer of British Expeditionary Force

Early in January, conferences were held to discuss the possibility of sending a British expeditionary force to Greece, but the Greek General Staff, on learning the limited size of the force that could be made available at the time, decided that its presence would only tend to provoke Germany, while it was not strong enough to provide any material support.

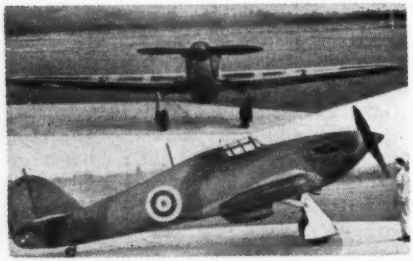
Battle for Valona

The Greek General Staff now realized that, if the Germans intended to make a move through the Balkans, they might be faced in the spring with a campaign on two fronts. They therefore considered it essential that every effort should be made to bring the Italian campaign to an end, or shorten their front in Albania. Consequently, early in February, the Greek armies in Albania started a fierce offensive in the direction of Valona. Bad weather,

however, intervened. The Italians were able to bring up reinforcements and the advance was held up just north of Tepelene.

Change of Air Policy

This battle for Valona is interesting from the air point of view inasmuch as a change of policy was forced upon us. Hitherto, my bombing offensive had been directed almost entirely upon lines of communications, ports and airdromes to the rear. The Greek soldiers on the front had experienced a severe winter and, although



Hawker "Hurricane" Single-seat Fighter.

full of fight, were not too well off for munitions and supplies. Consequently, it was essential that they should have the utmost encouragement and support that could be provided. This could best be given by my bomber force being used in close support of the Greek attack. I produced all the stock arguments against this form of cooperation. However, the Greeks reminded me that the morale of some of the Greek soldiers had been shaken severely by enemy bombing attacks, and that the success of the whole operation might depend on the stimulus afforded by seeing the Italians treated in the same way. I therefore acceded to their requests.

Reorganization of Command

If successful close support was to be provided, a certain reorganization of my forces was necessary. Accordingly, I formed a wing headquarters in the area of operations and moved part of my bomber force to a landing-ground close to the front. I delegated the command and operation of all the bomber aircraft engaged in this operation, and a fighter squadron, to the commander of the wing who was in constant touch with the Greek commander conducting the land operations. From a purely local and spectacular point of view, this form of cooperation was an instant and complete success. The morale of the Greek soldiers was raised considerably and I received fulsome praise and appreciation of the work carried out by the pilots. I felt, however, that this high regard was based on false premises, for we were misemploying our aircraft. Later events proved this to be the case. If the weather had been kinder, the Greeks might have succeeded in attaining their objective, but heavy falls of snow and rain held up their progress, and early in March the Italians staged a heavy counterattack which, although held by the Greek forces, destroyed all hopes of capturing Valona.

Arrival of Hurricane Aircraft

During the latter part of this period an event of considerable importance concerning our fighter strength occurred. The first six Hurricane aircraft appeared in Greece. Up till now the pilots in our two fighter squadrons had been doing grand work with their Gladiators, but with the gradual appearance of faster and better types of Italian aircraft, they were finding themselves at a disadvantage. On 28 February, in company with a formation of Gladiators, they destroyed twenty-seven enemy aircraft without a single loss to themselves. This fight, which was the biggest ever fought in the air in Albania, was staged over the Greek lines in full view of both armies.

British Expeditionary Force

The Germans had by now completed

their subjugation of Romania and were repeating their customary penetration tactics, this time into Bulgaria. It was all too clear that it was only a matter of time before the German Armies would be on the Greek northern frontier. The attitude of the Yugoslavs, on whom the defense of the northern Greek territory depended so much, was non-committal and unsatisfactory. The Greeks were in no doubts that, if they allowed British fighting troops to enter their country, war with Germany was ultimately unavoidable. They preferred to accept such a situation rather than have to submit when the time came to a tame capitulation in face of overwhelming force. A British force was rapidly assembled in Egypt and the first troops started to arrive in Greece on 7 March.

Reorganization of RAF

The arrival of the British Expeditionary Force and the establishment of a new front meant a further reorganization of my force. Although very few reinforcements had arrived as yet, and my pilots and aircrews were beginning to feel the strain of heavy and continuous operations throughout the winter months, an additional burden was now thrust upon us. I still had to provide air support for the Greeks who were being ferociously attacked in Albania by the Italians. I had to provide air escorts for incoming convoys, also some form of air defense for the ports of disembarkation of British troops which were becoming alarmingly congested. I had to deliver occasional attacks on the Dodecanese Islands to reduce the scale of enemy attacks on convoys which were becoming embarrassingly frequent, and, finally, I had to allocate a portion of my force to support the position in process of occupation by British troops. Apart from the fact that all my squadrons were much below strength in serviceable aircraft due to the heavy casualties we had suffered and the unavoidable inability to keep us supplied with replacements, the re-equipping of my fighter squadrons with Hurricanes was not proceeding as rapidly as I had hoped. Furthermore, the arrival of reinforcing squadrons was not keeping pace with the program decided upon, and those that did arrive were much below establishment in aircraft and equipment. In spite of these difficulties and disappointments, however, I still hoped that time would be on our side when the German attack developed.

German Invasion

The Germans declared war against both Greece and Yugoslavia on 6 April, and commenced invading both countries.

Gloster "Gladiator."

When Germany commenced the invasion, my force was organized as follows:

A Western Wing—consisting of one bomber and one fighter squadron (Gladiator) supporting the Greeks in Albania.

An Eastern Wing—consisting of two bomber and one Hurricane fighter squadron supporting the Anglo-Greek forces facing the German advance. The squadrons of this wing occupied landing-grounds on the Larissa plain.

In the Athens area, I had one bomber squadron and one fighter squadron in process of rearming with Hurricanes. Expressed in terms of aircraft, my total serviceable strength in the country was

some eighty aircraft, to which were opposed, according to all reports, approximately 800 German aircraft on the Eastern front (Bulgaria and Romania) and 160 Italian aircraft based in Albania plus 150 based in Italy but operating over Albania and Greece.

Eastern Wing

The first problem with which I was faced in forming the Eastern Wing was disposing the air forces I could make available. My intention was to provide each squadron with a base airdrome, and at least one and, if possible, two satellite landing-grounds.

Bristol "Blenheim" Mk IV Bomber.

The location of the fighter squadron was influenced by its role. This was threefold:

(a) To protect the base area, which included the army lines of communications, the port of Volos and our airdromes in the Larissa plain.

(b) To provide fighter escort to our bombers.

(c) To deal with enemy fighter aircraft in the battle area.

Larissa airdrome was the most suitable from the geographical and communications point of view, and was one of the few airdromes which was serviceable for all but a comparatively short period during the winter. Accordingly, the fighter squadron was based there with a satellite on a piece of suitable ground seven miles to the west.

As regards the two bomber squadrons, it was my original intention to station them at Almyros, where I hoped they would be sufficiently far back to be immune from escorted bomber raids and low-flying fighter attack. Unfortunately, the Greek Air Force was already in occupation of this ground, and I did not consider it safe for reasons of congestion to station more than a squadron there. The other squadron had to be sited temporarily at Larissa, pending the discovery of a more suitable ground. This was found eventually at Niamata. Thus, the Blenheim squadrons were located at Almyros and Niamata.

The one army cooperation squadron, which arrived as the German attack developed, I stationed at Kazaklar, where it was suitably sited for meeting the army needs.

It should be realized that the German invasion of Greece started at a time when very few landing grounds were fit for use on account of rain. They were just beginning to dry, and had the attack been delayed for even a week we would at least have had several more satellite landing-grounds at our disposal. As it was, the change in the weather favored the Germans.

Eastern Wing HQ

Considerations influencing the location of the Eastern Wing Headquarters were:

(a) Ability of the wing commander to make quick personal contact with force commander.

(b) Reliability of communications.

(c) Ease of access to operational squadrons under wing control.

(d) Reasonable proximity to airdrome.

The fully established wing headquarters failed to arrive in Greece by the outbreak of the campaign and, therefore, after consultation with the force commander, I decided to locate the skeleton wing headquarters beside Force HQ at Elason.

Liaison with Force HQ

The wing commander visited the force commander in his office each morning as a routine, and daily discussions were held

The force commander was fully informed of the air situation and made no excessive demands upon our resources. Without exception, the utmost was done to meet the requirements of the Army and every request for reconnaissance was followed by a faithful endeavor to carry out that task. At the outset, however, weather was a serious hindrance, and in spite of the most frequent and determined efforts many failures had to be reported.

The German Advance

On the morning of 6 April, the German forces were on the march. The bulk of the enemy moved west from the Struma valley. The first air reports indicated that an attack was being made upon Mt. Beles and the Rupel Pass. Simultaneously, our reconnaissance aircraft reported movement of motor transport on the road west from Petrich.

The fighters were sent off to carry out a sweep over the road and over the Germans on Mt. Beles and in the Rupel Pass. Twelve Hurricanes met twenty Me-109s, and our fighters shot down five without loss to themselves.

Meanwhile, reconnaissance of the Struma valley were being carried out. During the course of that night Sofia, Gorna Djumaya, Simitli and Petrich were bombed by Wellington and Blenheim aircraft both from Athens and from the Larissa plain. These raids were most successful. A large proportion of the German forces moving west against the Yugoslav armies had to pass through Strumitsa, as well as all the forces advancing on Salonika and those about to deploy themselves before our position in the Mt. Olympus region. Consequently, as many heavy attacks as possible were made against targets in this area.

On the following day the bad weather continued, but in spite of it we were able to get some of our reconnaissance machines through, and again in the evening we bombed enemy motor transport in considerable concentration near Strumitsa.

The wing commander had received an appeal to give bombing support to the Greeks who were cut off in the Salonika area. On consulting the force commander as to the relative danger to the Army of the various points which the German advance was threatening, the wing commander decided, in view of the limited opportunities for air operations offered by the weather, and in view of his limited air resources, not to dissipate any effort on a front which was already lost in spite of the gallant action still being fought in the Rupel area by the Greeks.

The situation was beginning to unfold, contact was expected shortly on the Olympus line, but anxiety was felt on account of the ineffectiveness of the Yugoslav resistance and the lack of information as to the situation in the north. Every effort was made by our air force to alleviate the pressure on the Yugoslav Army in order to give them time to withdraw i front of the highly mobile German forces, and to take up strong positions in the mountains and gorges.

First Withdrawal

During the next few days, until the complete evacuation of the Larissa plain on the 15th, enemy motor transport columns and concentrations on the roads between Prilep and Bitolj and in the Amyntaion area were bombed successfully by our aircraft. Our army had had little time to prepare strong positions in this area, which they had hoped would be protected for some time by the resistance of the Yugoslavs. A heavy burden was, therefore, thrown upon our air forces, which now virtually had to make up for the time lost by the caving-in of the Yugoslav forces. No stone was left unturned to delay the enemy and to shield our ground forces. Meanwhile, our Army was engaged in fighting a rearguard action in the areas around Amyntaion and Kleisoura.

No sooner was the withdrawal to the Aliakmon line complete when, on account

of the threat to its left flank, it became necessary for the Army to make a further withdrawal to the Thermopylae line. Consequently, all RAF units on the Larissa plain had to be withdrawn at once. At the same time, the RAF continued to throw all its power into delaying tactics.

On 14 April, the weather improved and German air activity intensified. The Germans had brought their fighters forward to the Prilep and Monastir areas, where their engineers had prepared the necessary landing-strips. The German Air Force was mainly directed in close support of their army, and heavy dive-bombing attacks were made against our troops. Our Hurricanes, escorting our bombers in attacking enemy motor transports on the roads near Ptolemais and disorganizing his lines of communication, shot down many enemy aircraft.

On 15 April, the main effort of the German Air Force was directed against our Air Force, which had been delaying their military operations and had taken toll of their aircraft. Large numbers of short-range fighters made their appearance over the Larissa plain and ground-strafed Niamata. In spite of antiaircraft, every aircraft of the Blenheim squadron located there was destroyed. Owing to the breakdown of the Greek observer system, our fighters were at a hopeless disadvantage. I ordered the squadrons to withdraw to the Athens area forthwith.

Albania Front

Meanwhile, the wide maneuver of the German forces advancing swiftly through the mountain passes northwest and west of Skoplje was developing. Their intention was to force contact with the helpless Italian forces near Kukes in northern Albania and to threaten the right flank of the Greek Armies in Albania from the Lake Ochrida area. The Greeks, who had fought so valiantly against the Italians throughout the winter months, were hardly in a position to withstand the extra pressure of the German forces. Withdrawal from Albania in the Koritsa area had been considered expedient by British commanders before the German invasion began. However, the Greeks did not take a sufficiently strategic view of warfare to allow such a withdrawal to be carried out without seriously affecting the morale of the army. When, in fact, the withdrawal was eventually forced upon them, it was too late. The Greek army commander at Yannina capitulated to the Germans.

As the situation in this area deteriorated, it became increasingly obvious that it was necessary to withdraw the RAF Western Wing.

Second Withdrawal

At this juncture I decided to abolish the Eastern Wing and take over control of all operations from Athens. I left an RAF officer at Force HQ to act as liaison between the army commander in the field and myself. Later, when Force handed over the direction of the withdrawal to Anzac Corps, this officer was attached here. The army commander desired only reconnaissance and fighter protection which we did all we could to provide.

Throughout the withdrawal the army cooperation squadron carried out what reconnaissance it could. After they had evacuated Kazaklar, north of Larissa, they operated their few aircraft from Pharsala. Later they operated from Amphiklia, just behind the Thermopylae line. Here there was a Greek Gladiator squadron which was ground strafed and destroyed as soon as the Germans were able to locate their fighters on the airdromes on the Larissa plain. The army cooperation squadron's Hurricanes were not on the airdrome at the time of the ground strafing, and so luckily escaped, but I considered it wiser to bring them back to the Athens area.

In view of the complete numerical superiority enjoyed by the enemy, I decided to operate my Blenheim squadrons by night as much as possible in efforts to

delay the enemy's advance. But after the decision to evacuate had been taken, the whole weight of the German Air Force was turned on the Athens area and there was no alternative but to save what air crews and material remained. These squadrons ferried the remainder of the personnel of their squadrons to Crete.

Direction of Bombing Effort

As far as the direction of bombing is concerned, the operation against the Germans followed four clearly defined phases:

The first phase, lasting for about two days, was the disclosure of the enemy plan prior to gaining contact with our troops. During this phase, bombing was directed at previously arranged targets in the Struma valley, including Petrich, Simitli, Gorna Djumaya and Sofia.

During the second phase, in which the direction of the German advance was recognized, and in which every possible effort was made to alleviate pressure thrown against the Yugoslav Armies in the west and the Greek Armies in the Salonika area, bombing was directed against supply columns and concentrations of enemy motor transport at the bottle-neck around Strumitsa, where the German forces divided into two columns.

The third phase, in which a serious threat developed against the British Armies in the region of the Monastir gap, was devoted to the bombing of bottlenecks, railway junctions, stations, bridges, defiles and concentrations of enemy motor transport on roads leading towards the Monastir Gap, from Skoplje, Veles, Prilep to Bitolj.

The fourth phase was the direction of all our air efforts in hindering and delaying the advancing Germans to allow our Army to conduct a successful withdrawal.

Targets were chosen at points where it was calculated that the effect of dislocation would be most widespread among advancing German columns, and yet close enough to the rear of the German fighting troops to have the maximum immediate effect upon the progress of their advance.

Withdrawal of Fighter Squadron

The fighters were withdrawn to the Athens area, since no airdrome north of this was free from ground strafing. The constant lack of intermediary airdromes made it inevitable that, if our fighters were placed on an airdrome from which they could give protection to our troops, they were in immediate danger of destruction by ground strafing as soon as they were on the ground. If, on the other hand, they were placed beyond the range of ground strafing, they were unable to protect our troops and the tightly packed columns of motor transport, withdrawing along the roads. The utmost efforts were made to give the maximum protection to our continually harassed troops. All our machines were working to maximum capacity.

On 20 April, approximately 100 dive-bombers and fighters attacked the Athens area; my whole force of fighters of fifteen Hurricanes intercepted them, bringing down a total of twenty-two enemy aircraft confirmed and eight unconfirmed for a loss of five Hurricanes. Small as our losses were, they were crippling to our small force.

Final Evacuation of Air Forces

On 22 April, I sent the remaining Hurricanes to Argos. From there I intended that they should cover the evacuation of the British Army, but the German air attack became so concentrated that after a number of Hurricanes had been destroyed on the ground on 23 April, the remainder were ordered to leave for Crete. In Crete, Blenheim fighter patrols were organized to cover the ships evacuating the troops from the beaches. These escorts were maintained throughout the evacua-

tion without respite, and I consider it was due largely to their efforts that such a large proportion of the total British forces in Greece were evacuated.

Conclusion

Where we are in possession of totally inadequate air forces, there will always be requests from every direction for the air support which in ideal circumstances we would comfortably be able to provide. In Greece we had the minimum, and in order to produce any results at all it was essential that all available force was directed in accordance with a carefully conceived plan. As our bombing forces were inadequate to deal decisive and instantaneous blows on the enemy, our policy had to be to sustain our small efforts for as long as possible at points where the resultant dislocation caused the enemy the utmost embarrassment. This we were able to do in Albania, for the Italian air strategy was extremely weak, and the numerical odds were only some four or five to one against us. When, however, we had to face the full force of the German onslaught in addition, the odds became too great.

In spite of the strategic and tactical disadvantages under which our air forces labored in Greece, in spite of the great enemy superiority in numbers, and in spite of the weather conditions which there can be no doubt were the worst in which British Air Forces have had to operate throughout the world, a considerable offensive effort was developed. During the Albanian and German campaigns in Greece our fighters destroyed 232 enemy aircraft confirmed, and a further 112 unconfirmed. Our bombers operating by day and night dropped 550 tons of bombs on the enemy.

The participation of our land forces in the Greek campaign was dictated entirely by political considerations, and we were fully aware of our weaknesses both in the air and on the ground. I have heard criticisms made that, under these conditions, we should never have sent a land force to Greece. In my opinion, the decision made was a right one and in accordance with the best traditions of our race. There was always the chance that Germany would respect the neutrality of Yugoslavia and that the advancing armies might be delayed sufficiently long to enable our forces to be strengthened and our position made secure. On the other hand, if Yugoslavia threw in her lot with us, which eventually she did, it was reasonable to suppose that her soldiers, renowned for their fighting qualities, would prove a tough nut for the Germans to crack, and they would be able to protect our left flank. In any case we would be containing large enemy land forces and air forces at a time when Britain needed a breathing space to perfect her defensive arrangements.

Furthermore, the assistance which we were considering was to be given to a nation which had sacrificed her all in our cause and was herself quite prepared to face complete extinction rather than capitulate. I suggest that it would have been difficult to refuse her this help, and our conduct would have been most reprehensible in the eyes of our countrymen and those of important neutrals, had we failed to do so.

Defense Direction and Defense Staffs

Translated and digested by the MILITARY REVIEW from an article in "Ny Militar Tidskrift" (Sweden) No. 6, 1947.

MODERN war has everywhere given prominence to the question of the proper organization for directing a nation's supreme defense. Particularly lively, not to say heated, have been the discussions in the United States and England. Even in Sweden this problem has been the object of discussion, although as a result of the 1936 resolution relative to the establishment of a defense staff, we have managed to follow trends closely, and consequently have been able to escape the bitter controversies which arose in other countries during and after World War II.

What has forced this problem to the front? It is the nature of modern warfare. Because of the fact that military operations have assumed total characteristics and have come to be based entirely on cooperation between army, navy and air force, modern military forces have come more and more to possess the characteristics of a unit. The old doctrine of three separate forces is no longer applicable. Modern innovations have given rise to breaks with older views, thus causing sharp clashes of opinion in other countries. Nevertheless there is clearly evident a tendency to reduce the independent direction of defense branches and to weld these branches together in closer relationship. The trend of development clearly appears to be in the direction of further unification of the three branches of defense. The consequence of this tendency is a system in which the idea of a "defense branch" gives way, to a supreme defense with centralization of powers. Thus far, the Soviet Union is the only country that has adopted this course. But what can happen in a totalitarian state cannot be brought about so easily in a democratic nation. Here things must be permitted to mature slowly and reforms must be voluntarily accepted by all concerned. The question can be asked whether it is proper to carry centralization to the extreme. It is possible in this manner to create an unwieldy, bureaucratic system, and to dampen the spirit of initiative and capacity for action of executive agencies which are likely to be forced to act largely on their own initiative in a future war.

When one studies the experiences and follows the discussions of other nations, one must, of course be on guard against conclusions that are not pertinent in our own case. The discussion in the United States reveals, among other things, how great a difference there is between a great power and a small state. In the United States the different defense branches possess, in themselves, more power than the entire fighting forces of a small state. That which is difficult to combine in a great power is easier in a small state where the forces are smaller and the problems, consequently more easily solved. Also, a small state is compelled to concentrate its fighting forces, particularly when the small state in question occupies an exposed position and must be ready to go into action without delay.

The defense organization adopted in Sweden in 1942 has had its merits and gives expression to important principles. There is incontestible need for a defense staff with the power of combined command. There is a certain predominence in the activities of the ground element. But there is nothing unusual or strange in that. For example, the United States and England, during World War II, were able to fight on foreign soil and, consequently, had special need of powerful naval and air forces, the situation was quite different in countries which were obliged to fight against an invading ene-

my. There the emphasis lay on ground forces.

The question is: How strong should the influence of the ground forces be on the defense staff? It is on this point that criticism against the present Swedish organization began. It has been noted that matters relative to the ground forces have come to dominate strongly the activities of the defense staff which, consequently, has lost its character as a joint staff, and instead has been functioning as a ground force staff over and above the various ground force staffs proper. This has led to the criticism that the navy and air force representatives have come to play a subordinate role and have not been able to exercise due influence on the official activities of the staff. And so it has come about that questions relative to navy and air force have been dealt with by ground force officers, leading to one-sided judgments. Duplication of effort has developed and the system has tended to confusion and irritation, together with loss of interest and sense of responsibility.

In a certain sense, criticism has probably been carried too far and has been the result of more or less pronounced branch thinking devoid of a whole-hearted willingness to accept the basic idea of the defense staff. One seems to perceive, in certain branch representatives on the defense staff, an inclination ceaselessly to defend their special branch point of view.

It is natural to act this way when one finds himself with the minority. There must, however, be a reason for the criticism that has arisen. The majority of it has been aimed at the ground forces. Even though the latter must be most heavily represented on the defense staff in numbers, the ratio of representation between the different branches should be reasonable so that the naval and air forces representatives will not feel themselves to be squeezed out. It cannot be maintained that the present system has been a complete success in creating dependable cooperation. It is likely that no truly frictionless system could be created, but the effort should be made to reduce to the greatest possible degree any grounds that may exist for discord.

Two solutions of the problem are possible: either a reduction of the ground force representation, or an increase of the naval and air force representation. This brings up the question of a large or a small defense staff. Arguments are to be found for either alternative. Earlier concepts with respect to the appropriateness of a small defense staff have, to a certain extent, been challenged by our six years' experience. The complex nature of the art of war and the increased demand for cooperation work against the idea of a small defense staff. Such a staff would also make for the separation it is desired to prevent. An increase of the defense staff by a complete transfer of naval and air force operational tasks to the defense staff appears a rational solution, but probably in the present situation this is hardly a practical policy.

However, if one desires to establish a better balance than at present, he might give some thought to augmenting the naval and air force representations, thereby giving them greater influence. In order to strengthen the bond between the defense organization, on the one hand, and the navy and air force on the other hand, the expedient might be tried of letting the operational problems of the respective branches be dealt with by one and the same administrative body, with the chiefs of the naval and air force sections of the defense staff carrying on the operational work in their respective branches together, with the additional help of the administrative body. By strengthening the position of the navy and air force on the defense staff and providing a basis for common operational labor, it may be possible to solve another problem which has

caused criticism, namely, the question of filling posts on the defense staff. Heretofore, these positions have been left to ground force officers, but such a system cannot be of advantage in the long run. It is productive of ill-feeling and excludes persons who, by virtue of their general insight and good judgment, would be well suited for filling these positions.

Any organization, be it ever so ideal, stands or falls with the ability or lack of ability of its administrative personnel to cooperate. To stand guard, in a one-sided manner, over special interests, creates discord and diminishes the effectiveness of any military organization. An active willingness to cooperate does not exclude independent opinion, but paves the way for voluntary agreements inspired by the spirit of loyalty. If one desires to make the concept of unity of military strength a living idea, he must remember that it is obtained through unity on the part of those who are directing it.

Occupied Japan

Digested by the MILITARY REVIEW from an article by Lieutenant Colonel F. J. C. Piggott in "The Army Quarterly" (Great Britain) April 1947.

THE British Commonwealth Occupation Force (BCOF) in Japan consists of elements of all three services of four different countries. The United Kingdom, Australia, New Zealand and India have each sent contingents, the majority of which are soldiers. A naval party is ashore under the Naval Officer in Charge, Kure, while the Air Forces have squadrons from all four countries. The Army organization similarly consists of formations from the same four countries. BCOF Headquarters, the British Commonwealth Base and Tokyo Sub-Area are integrated so that all nations and services are intermingled. Soldiers form the backbone, but the Air Forces are strongly represented and we find, for example, that the Chief of Staff is an RAAF Air Vice Marshal and that the senior staff officer, Royal Engineers, is a South African Wing Commander in the RAF.

Space forbids a more detailed description of the Force's composition, but a few words on its control are necessary in order to understand how it works. A little over a year ago a very great step forward in Imperial military collaboration was made by the establishment in Melbourne of a Joint Chiefs of Staff Committee. It is a small but "high-powered" body similar to the Anglo-American one in Washington, but consisting of the representatives of the three Chiefs of Staff of Great Britain, Australia and New Zealand, and of the Commander in Chief in India. This body is charged with giving policy direction, consulting the national Chiefs of Staff when necessary, and then passing their decisions to the Australian Service Headquarters of the Commander in Chief, BCOF for action. It will, therefore, be seen that the executive responsibility for the maintenance and administration of BCOF as a whole lies with Australia, although many requirements are passed on by Australia to the countries concerned, examples being Indian foodstuffs, reinforcements and uniforms peculiar to the national contingents.

The system is a complicated one. All ranks find themselves using procedures and documents strange to them. Customs of the various services differ, and a military policeman carrying out the simple task of checking drivers' work tickets must be prepared to cope with one of twelve different forms. For the first time

in peace, a Commonwealth Force has been called into existence; that it should be made to work is not merely important, but essential. And for this much give and take, and understanding of the other's point of view, is necessary.

Contact with US Army

With the exception of Tokyo Sub-Area, the British troops in Japan are situated in the Island of Shikoku and in the five most westerly Prefectures of the main Island. Throughout this area, however, American personnel are to be found, for they carry out all Military Government functions and also counter-intelligence work. Our own commanders and staffs are naturally much interested and involved in these, and the cooperation between the Americans and ourselves is very close. My own experience was that the Americans were always very pleased to see us and to accept the help we had to offer. When I left Japan in September the American Forces were considerably under strength and their replacements were, like ours, young and inexperienced. Consequently any officer resident in the same area for a considerable length of time was a very present help in trouble.

It must also be stated that on the highest level the military relations between the two countries are more than usually cordial. The Australian commander in chief of BCOF reiterates continually both in public statements and in private conversation that General McArthur and General Eichelberger go out of their way to be cooperative and helpful.

Relations between British and American troops vary a good deal, but in general are uniformly good. Certain special friendships have sprung up between units and formations, and of course there are a great number between individuals. Australians too are particulary popular with those Americans who have served in the Pacific. But individually it must be admitted that our men occasionally suffer from a slight inferiority complex in American company. An important contributory reason for this is the British summer uniform of jungle green. The Army in India has now given up the familiar khaki drill and is converting to green, and therefore all the British and Indian troops, having gone to Japan from India, wear green in the hot weather. This looks well enough if well and frequently starched; but unfortunately the American Army wears khaki except when on fatigue, when *they* wear jungle green. So the soldiers from India or the United Kingdom looks as if he is permanently on fatigue in American eyes. Australian and New Zealand troops are not so handicapped; and the Indians are better off than the British, as they can use rice-water to starch their clothes. Rice is as uncommon in the British ration as is starch in unit canteens.

Tokyo

In Tokyo there is a British Commonwealth Sub-Area. It is responsible for liaison with General Headquarters, and for the administration of all British service personnel stationed in or on transit through Tokyo. Also it has been made temporarily responsible for the administration of all British civilians there. The chief British military body there is always an infantry battalion, as the infantry units take it in turn to do a month's guard duty in the capital. The non-military and quasi-military bodies in Tokyo are almost impossible to enumerate, surrounded as they are with satelites which come and go and amalgamate and disintegrate like heavenly bodies. The largest is the United Kingdom Liaison Mission, housed in the British Embassy and headed by a diplomat with Ambassadorial rank. We are represented on the Allied Council for Japan by an Australian who speaks for the Empire with his own staff; he has the rank of Minister. Then there is the Canadian Mission. India, too, is represented. It is the British custom to smile tolerantly at foreigners

who confess that they cannot understand how our Empire works; we regard this as a broad-minded admission of the general inferiority of foreigners. But after two months duty in Tokyo, I must admit that foreigners who say this (and they do say it) have my sympathy. Whether it would be possible to devise a method whereby our activities, whether diplomatic, economic, military or in the sphere of public relations, could be concentrated is difficult to say. But if it could, it would, I am sure, redound to our advantage.

Occupational Problems

The occupation of Japan, compared with that of Germany, presents few problems, mainly owing to the fact that the country is under the executive control of one man—the Supreme Commander for the Allied Powers. All SCAP directives to the Japanese Government are issued by his General Headquarters, and appear in crisply worded military phraseology. His policy, too, is operative throughout the whole country, and this simplicity is particularly suited to the modest intelligence of the Japanese man in the street. Its firmness and clarity are also suited to the mental state of the Japanese, stunned by unexpected defeat and groping for something to take the place of the regimentation of their former existence.

General MacArthur issues his orders to the Japanese Government, who are then responsible for their execution through Japanese agencies and therefore in accordance with Japanese methods. But throughout the country there are Military Government teams in every Prefecture, backed up and assisted by the tactical troops and the various military intelligence organizations. These check that SCAP directives are carried out, and watch continually to insure that SCAP policy is not disobeyed either deliberately or through ignorance and misunderstanding. Misunderstanding is a common cause of error.

On first arrival, it was natural for BCOF to investigate closely the possibility of action by the Japanese against the Occupation Forces. Though we sought diligently we could find no evidence of this, and it is my opinion that none will be forthcoming.

It was anticipated that repatriated Japanese ex-servicemen would be a source of trouble, but this has proved to be unfounded. The men themselves are only too anxious to revert to civilian status, and the great majority have returned to their farms and small country businesses peacefully and gratefully. They express surprised pleasure at the behavior and moderation of the Allied Armies, in comparison with their own activities in areas occupied by the Japanese Army. Japanese who were prisoners of war in British hands often make themselves known to British or Indian personnel (distinguishable by the Union Jack "flash" on their left arms) rather in the same manner as an Englishman will approach a stranger wearing his old school tie. Ex-servicemen often form small societies, and these are closely watched by Allied personnel. While they form obvious covers for the illegal secret societies so common in Japan, these associations are almost always either designed solely to assist members to obtain employment or exchange food and clothing, or else aim to democratize the country or improve its morals.

While it takes time and a considerable amount of labor to check these activities, no real problem arises. The Japanese police and Prefectural officials are cooperative as a general rule, for anyone found unhelpful does not retain his job long. The police of Japan used to be world-famous for their efficiency and unpleasantness; now they are undistinguished for either, being for the most part young and untrained, and nervous of excercising authority unless sure of early Allied support. They therefore often have to be prodded into action.

Particularly is this the case where Koreans are concerned. The Koreans resident in Japan before and during the war were mostly ill-educated laborers, and when they discovered they had been liberated the knowledge went to their heads. Those who wished were repatriated to Korea, but the conditions they found there were such that many tried to return, bringing with them the danger of cholera. BCOF have had to impose air, sea and land patrols to prevent this, in a manner strangely similar to those off the coast of Palestine. Meanwhile the Koreans who decided to remain in Japan developed a marked disinclination to work, and devoted their energies to venting real or imagined grievances on the stunned and defeated Japanese. When the unemployment situation became acute, employers naturally preferred to engage hard-working Japanese to truculent Koreans, and so a situation developed whereby the Koreans virtually all lived by their wits—some by choice and some by force of circumstances. The black market absorbed the majority, assisted by small-time gangs of thugs. They are subject to Japanese law, and they have a marked aversion to any representative of law and order, particularly Japanese policeman. A number are armed, and as they are prone to band themselves together when being a nuisance, the nervous Japanese police are liable to turn a blind eye. This leads to Japanese civilians secreting arms in self-protection, and a vicious circle is formed which needs constant attention from Occupation troops.

Another body which presents a problem is the Formosans, probably Japanese citizens for the whole of their lives but now officially deemed Chinese. Most of these men in Japan today could be reasonably termed collaborators for their activities during the war, and it is at first startling when checking on certain characters who are loudly advocating freedom, democracy and youth movements, and who are taking high-handed action against and denouncing all that is Japanese, to find that these same people were Japanese Air Force pilots and, in at least one case, actual suicide pilots. No one can accuse them of not knowing which side their bread is buttered.

These people, like the Koreans, are faced with earning a living in an unfriendly world. Their newly acquired position as "Allies" has led them to interfere with the functioning of Military Government in a number of cases, and many have been guilty of illegal financial transactions.

It is fair to say, in fact, that the Formosans and Koreans cause more, or certainly as much, work as the Japanese to intelligence and provost personnel. Japanese minor officials are often detected in illegal financial dealings, of which the most common was the seizure and resale of Japanese military stores shortly after the capitulation. But the general state of Japan today is one which compares very reasonably with the standard in the rest of the world. They have labor troubles, a food shortage and appalling destruction of homes and industries to face. But no one need starve, and light industries are recovering remarkably. Similarly Japanese houses, or shacks, are quickly built if material is available, and the Japanese are naturally hard-working. The burden of the occupation is comparatively light, and the people are showing a remarkable willingness to learn a new way of life. All this makes the tasks of the Occupation Forces easier, and with fewer problems it is possible to progress more swiftly with the large task of destroying Japanese war materials.

Japanese Reactions

In September last I had a talk with a Japanese economist long resident in London, who had returned to Tokyo. At the end of the war he had fallen under a blanket purge from General Headquarters

which had removed from office all directors of the Yokohama Specie Bank, and when I met him I asked him, as an old acquaintance, to tell me what he thought were the general public's views on the occupation. He said that while it was not possible for any foreign army to be popular in the country they were occupying, he considered that the present occupation of Japan got as near to popularity as it was possible to do. He quoted the order forbidding Allied troops to purchase local foodstuffs; the American gifts of food to Japan; the orderly behavior of the troops; the non-requisitioning of hospitals or schools except where absolutely essential; and the immense personal prestige of General MacArthur. I believe his statement to be correct, and undoubledly the Americans are building up a great store of goodwill which will stand them in good stead after the peace treaty with Japan is signed and trade becomes more normal.

He also said that educated Japanese hoped the occupation would continue for not less than five years. His reasons for this were that the present leaders of Japan, who were doing their best to lead the country into democratic ways, were men who throughout the war were in political obscurity or retirement, if not in actual danger of their lives. A too early termination of the occupation would expose these men to a reactionary swing of the pendulum, the undoing of all their work, and the fate reserved for quislings. The leaders in question are not solely the Cabinet Ministers: thousands of men and women in towns and villages are taking the lead in indicating, within the limits of their ability, the new way of life, and are doing so with the knowledge of Allied support. They are numerous and, in the opinion of people well able to judge, sincere.

The British Position

The above remarks apply to both British and Americans, but certain Japanese reactions differ with regard to ourselves as compared with our Allies. To start with, we are outnumbered by about four to one, and virtually all our troops are located in the quiet, agricultural west country of Japan. There we are popular, especially now that the local people have got used to the difference between our customs and those of our American predecessors.

In Tokyo we are outnumbered even more heavily, and I think it important that very careful thought should be given to insure that the material that we have in the Capital, and in our area, should be of first-class quality. Thought should also be directed to the future, and by that I mean ten years ahead rather than the next six months. It is so easy to prejudice our economic and political relations with the Japan of the future by small, unconsidered actions in the Japan of today. This presupposes, of course, that we want these relations to be good.

It seems to me that any occupation must be divided into two periods—punitive and educational. I was not in Japan during the first six months of the (purely American) occupation, so cannot say if they were "punitive" then. But without a doubt they are now, either by accident or design, fulfilling an educational role. They are friendly in the streets, and only a "public display of affection" is barred; they give away candies and gum and cigarettes, and play with the children. We are by nature more aloof, and our aim is to appear cold but correct. Again, the Americans in Japan were (in September) part of the "Army Forces, Pacific Area Command"; we are the "British Commonwealth *Occupation* Force." The two titles when translated into Japanese emphasize that we are occupation troops, compared with the Americans who are merely among those present. The word "Occupation" in our title is certainly not necessary; is it, in the long

run, desirable? There is concrete evidence that it grates on Japanese ears—if that matters. I do not think it incorrect to say that to many Japanese the Americans are more popular than ourselves at present.

There is much that could be done to help our interests. The normal behavior of the British soldier, particularly that of the officer, is ideally suited to appeal to the Japanese, and we have many other advantages. All that is needed is a little thought on long-term policy, particularly with regard to how the Japanese mentality will react to a given course of action, and we will not only be able to give the Japanese a working example of the British way and purpose, but will be casting our bread upon the waters.

The Future of Fortifications

Translated and digested by the MILITARY REVIEW from an article by Major Jesus Olivares Baque in "Ejército" (Spain) May 1947.

Fortifications in World War II

THE apparent ease with which the most powerful fortifications were overcome in World War II led many persons to conclude that they are useless. However, to establish honestly if these fortifications were used as contemplated in strategic plans, it is necessary to study how the projects were conceived and worked out and the tactical design which determined their disposition. To complete such analysis it is necessary also to examine under what circumstances the troops sheltered in them had to fight.

The French preoccupation for their northern boundaries and an erroneous interpretation of the defensive battles of World War I led France to construct the Maginot Line, oldest of the huge, modern, fortified, barriers, and also the first to collapse.

At first it appeared that the Maginot Line was intended to economize the strength of the peacetime army and to protect the mobilization and concentration of forces at the outbreak of war. But the gigantic national effort in behalf of a project which was conspicuously defensive in nature gradually destroyed the offensive spirit of the nation and the army.

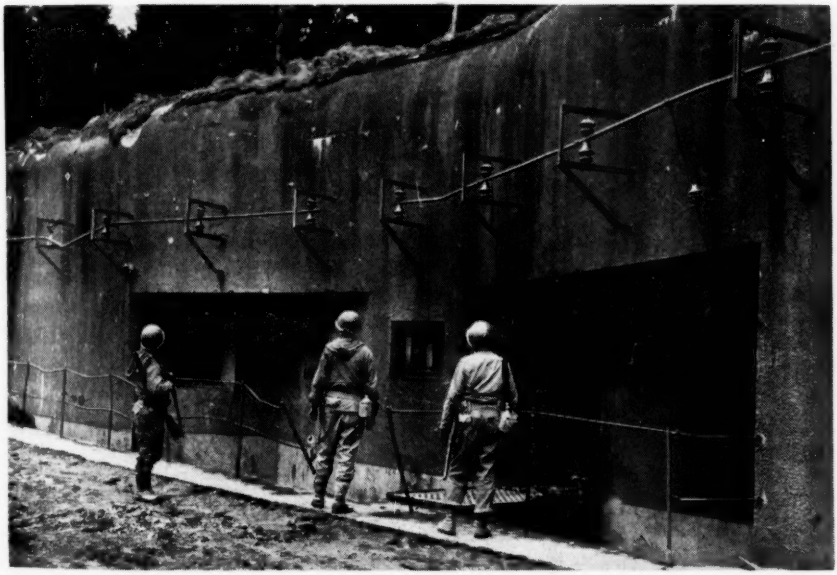
In our opinion, the construction of the Maginot Line was inspired by the theories of the French Lieutenant Colonel Tricaud in December 1923. He favored a screened installation of forts all along the border, the intervals protected by smaller structures with the heavy artillery in the rear, the line running as a center of development, support, and reinforcement for larger units which would cover the front at the outbreak of war. Modern armament, organization in depth, and a network of all obstacles, would complete the front.

When the war started, the line was completed as far as the Belgian boundary. Garrison troops were mounting guard in these formidable forts equipped with all facilities possible. The quiet of the first few months only served to further implant in the French mind the impregnability of the fortifications. So, when the moment came to meet the modern divisions of the German Army, there was neither the spirit, nor the means, nor the adequate command to meet the test. We can point out, however, that the Germans did not attack the Line frontally. Instead, the Germans attracted the maneuvering Anglo-French forces to Belgian territory and enveloped and annihilated them later, breaking through the French fighting front west of Sedan with their armored forces in a zone not covered by the Maginot Line.

A frontal attack on the Line was made at St. Avold and at the Rhine after Dunkirk and the fall of Paris, but these penetrations, achieved under such conditions, should not be considered normal operations.

It is true that the Maginot Line had many tactical defects, the main ones being deficient observation, limited fields of fire to the front, and, most important, little depth. So rigid were the plans of this defense that if one element fell, the whole system failed.

In spite of this, it cannot be said fairly that the Line did not fulfill its mission. It guaranteed, as was its main purpose, mobilization and concentration; provided time, which was not taken advantage of, to undertake an offensive; and its presence evidently influenced the German plan toward non-protected areas. No one contends that fortifications by themselves can decide a campaign. Even the fruits of a defensive battle are lost if maneuvering forces fail to complete the annihilation of an enemy brought to a halt and destroyed by fortifications.



Entrance to a Maginot Line Fortress. (Signal Corps photo.)

Russian Fortifications

The Germans considered that the Stalin Line was broken during the first days of the Russian campaign. We believe that it was a light line of fortifications, improvised in a short period of time, and without the strength of the other systems under study.

As to the fortress of Sebastopol, it was undoubtedly a powerful and typical example of a fortified naval base attacked and conquered from a land front. The Germans concentrated here much powerful equipment, predominantly artillery. Super guns and super mortars were responsible for opening the gap for the infantry and sapper assault units.

However, despite the great concentration of offensive forces, Sebastopol resisted during all of June and retarded the start of the German summer offensive of 1942.

It appears logical that the seige of Sebastopol had considerable influence on the development of the war in Russia, since it provided the Russian High Command with one more month to prepare for the German offensive.

German Fortifications

Because of Poland's position, the Germans faced a war on two fronts, and to carry out the strategic plan of beating Poland first and then France, the Germans constructed the Siegfried Line along its boundary with France.

The Siegfried Line was built by the Todt Organization using both civilian and military forces, and the speed with which it was completed was due to the vast resources used and good organization.

Siegfried Line pillbox disguised in a farmhouse. Note trenches. (Signal Corps photo.)

The tactical purpose of the Line was to protect the defensive deployment of large units. It was not a system of enormous forts with underground railways such as the Maginot Line. Its structures were generally small, sheltering at the most two or three automatic weapons and perhaps an antitank piece. The fortifications were from two to three meters of reinforced concrete, with large loop-holes and good camouflage. Obstacles of all sorts were numerous and well located, and the system had great depth reaching up to twenty-five kilometers in important sectors.

During the first months of war, the Allies did not intend to attack; and with her western flank protected, Germany could successfully complete the Polish campaign and later concentrate on massing its army to fight the Anglo-French forces under the protection of the Siegfried Line. On the start of the French campaign, the Line protected the passive sectors of the front, contributing affectively to saving strength.

It is unquestioned that the Siegfried Line perfectly fulfilled the purpose for which it was built. By the end of the war, it is true that it had been broken, but we must remember that although the German Army was fighting with inferior means, the breakthrough in the Aachen sector cost the Americans time and huge losses despite heavy offensive concentration at that point.

The second big German line was the Atlantic Wall. Its strategic mission apparently was to protect the coast against any landing while the war with Russia was brought to a finish. It was definitely designed to gain time.

The Atlantic Wall was made up of fixed artillery positions near the coast, and similar to the German fixed fortifications of 1914-18. In its interior there were coast artillery emplacements which, together with the redoubts which encircled the ports, formed a first line. A second defensive line beyond the effective range of naval guns was similar to the Siegfried Line and protected the rear areas and larger units.

The general organization of positions was in accordance with sound principles:

dispersion, echelon, fire power, adjustment of fire power, armor and camouflage. Without going into detail, it can be said that the Atlantic Wall could resist powerful air, sea and ground attacks for a period sufficient to permit the arrival of strategic reserves.

Without doubt, the existence of this fortified line had considerable influence on the progress of the war. It possibly forced the allied decision to attack Italy in the first place; in any event, two years were necessary to prepare the assault on the continent, a period certainly enough to liquidate successfully the Russian campaign, if it had developed according to German plans.

In June 1944, the long awaited allied landing took place preceded by a formidable air offensive which not only attained absolute air superiority, but also disorganized the transportation system of France. All of the bridges of the Seine and Loire were destroyed and the landing area isolated. Without air protection, the Germans were seriously restricted in movement and unable to launch their counteroffensive at the proper time. At last German resistance in Normandy was broken, but it took two months before the Allies could exploit their advantage, during which time the German fortifications resisted, reinforced only by local reserves. It was allied air power that prevented the arrival of German strategical reserves, but the wall accomplished the mission for which it was intended.

Conclusions

If we think of fortifications as employing "the passive resistance of the fixed structures to fulfill the principle of economy of strength," instead of as a means of winning a war by themselves, then it may be said that fortifications in World War II performed their role to perfection. Their apparent failure was due more to the failure of other means of combat than to their own defects. No fortified line is capable of resisting the modern offensive by itself.

The defense without adequate means, not fortifications, is on trial. Fortifications that are properly employed will continue to be invaluable to the commander who knows what can be expected from them.

Future Fortifications

Today, enemy air power constitutes a greater threat to mobilization and concentration than an unforeseen ground attack.

Against a mass air attack on the interior of the country, fortifications on the boundary are, of course, impotent, but they represent, undoubtedly, a considerable aid in shielding the nation against land invasion.

We can, therefore, say that the strategic and economic role of fortifications has not disappeared. But if their performance is to be effective, they must be complemented by air power to oppose the enemy attack on the interior of the country, thereby affording the army freedom of movement, and preventing vertical envelopment by airborne operations.

Fortifications can fulfill their tactical role, i.e., to protect the launching of the attack and to cover economically the passive sectors of the front, in the same way that other combat forces are protected by the air force.

Locating Fortifications

The threat against the enemy communications is still the most fruitful offensive or defensive maneuver. To guard against it is also, today, the most effective way to cover all theaters of operation. For this reason fortifications should form a continuous screen all along the coast or threatened boundary.

This does not mean that the structures should be allotted mathematically. They should be concentrated in the most accessible or dangerous sectors and reduced in those sectors least accessible.

Thus the ideal, that the defensive zone constitute a "solid of equal resistance" could be achieved.

In combat, fortifications are intended to reinforce the effect of fire power; facilitate exercise of command, and protect manpower against surprise, observation, bombardment, gas and inclement weather.

To accomplish this, fortifications employ emplacements, observation posts, armored shelter, and gas detection devices; obstacles of all kinds; communications; and camouflage and screens.

Artillery

Modern offensive power is mainly based on artillery fire power, air power, ground combat, and the mass employment of armor. We will examine successively their effect on fortifications.

Modern artillery is superior to that of 1918 because of larger calibers; greater range, accuracy and mobility; more pieces in the larger units; and the employment of special artillery formations in the initial stages of operations. Fortifications, therefore, will be subjected to an avalanche of projectiles of all calibers. To face this massed precision fire, dispersion and camouflage are necessary.

Steel turrets will be necessary for the protection of weapons, rather than reinforced concrete, while the latter will be used for interior shelter. Wherever possible, obstacles must be placed on counterslopes, and communications reduced and protected from observation.

Aviation

Insofar as this study is concerned, the principal progress in aviation is the great increase in bombing and reconnaissance.

Air bombardment is a powerful threat to fortifications, because of the increased size, accuracy and number of bombs. It appears impossible to defend oneself from a concentrated air attack simply by increasing the depth of the covering forces. The solution is to build small, well dispersed structures, thereby forcing the attacker to disperse his effort and thus reduce his effectiveness.

It will be necessary also to build structures in such a way that they can withstand, without disorganization, the effects of powerful nearby bomb explosions.

Progress in air reconnaissance, especially photographic devices, requires that camouflage be given serious consideration. Carelessness in this respect could be disastrous.

Armor

Regardless of the advances in armored vehicles and their mass employment, it appears that they are not yet capable of attacking a well fortified zone without the help of other arms. Nevertheless, they are the essence of assaulting forces, and their preponderance on the field of battle requires that fortifications utilize either natural or artificial antitank obstacles.

Such obstacles should be covered by antitank weapons, whose deployment should form the skeleton of the entire defensive system, in the same way that automatic weapons did in World War I. Fortified positions should be organized in small centers, dispersed, well camouflaged and protected, surrounded by obstacles against armor and personnel, equipped with powerful weapons, and echeloned in great depth.

The entire structure should be completed with artillery positions and good communications networks.

Good observation, adequate fields of fire, protection from enemy observation, and the existence of good obstacles will determine the tactical location of fortifications.

Such a fortified zone is quite similar to that which an army would use in a defensive campaign. It could, therefore, be garrisoned by the normal large units, and could serve to "shelter adequately a defensive deployment."

Mechanization of sapper units has modi-

fied the old concepts of "permanent" and field fortifications. Today the difference results more from the nature of the mission which fortifications are called upon to perform than the strength or type of structure. If protection of a frontier is necessary, its fortifications will be permanent, because of the mission it accomplishes, even though its structures are only simple emplacements of reinforced concrete.

When a fortified zone is built in peacetime, it cannot be known exactly the number and nature of the forces to be sheltered by it when it is used. Although these factors will have been settled in principle by estimation, the circumstances under which hostilities are initiated may cause them to vary radically. Thus the planning of the fortification must include a careful study of the terrain so that its structures will be built at key positions suitable for the weapons of any unit which may be assigned to the defense of the sector.

This is to say, "permanent fortifications should be planned and developed with a high tactical understanding" to which all technical demands should be subordinated.

Tactics of Jet-Propelled Planes

Translated and digested by the MILITARY REVIEW from an article by a German jet fighter pilot in "Flug-Wehr und -Technik" (Switzerland) May 1947.

THE considerably increased speed of modern military aircraft will, doubtless, be accompanied by a change in the tactics of their employment. Up to the end of World War II, very little information could be obtained on this matter. The reason for this is that the Germans had only begun the use of these fast planes (Me-262, Me-163, He-162) toward the end of the war, while the Allies, in spite of the fact that their jet planes had reached a stage of development where they were nearly ready for use on the front, apparently no longer desired to engage them. This resulted in an even more interesting situation. An air force which, numerically, was exceedingly powerful, equipped with planes operated by piston motors with maximum speeds of 500 to 600 kilometers per hour, was confronted with a very small formation of jet fighter planes with flying speeds of some 800 kilometers per hour. The employment of the German piston-motor fighters was rendered almost impossible by the adversary's superiority. During the first few weeks of its activities, the success of the jet plane was perhaps greater than had originally been hoped for. The main reason for this must have resided in the attendant element of surprise. When two or three Me-262s attacked a formation of twenty to twenty-five planes of the Lightning or Mustang type they, as a rule, brought down two or three of them while the rest of the formation scattered and fled. The tactics of such an attack were the simplest imaginable. The secret was to approach as unnoticed as possible, some 500 to 1,000 meters above the enemy and straight from behind, and out of the sun when possible. In order to fulfill these conditions, precise radar direction from the ground was necessary. The formation leader, on the basis of local weather conditions, chose the most favorable meeting situation and advised the fighter formation's directing officer, on the ground, of these conditions. It was then the latter's task to effect this meeting as closely as possible in accordance with these requirements. Since the directing officers directed both day and night operations, the meeting, as a rule, was effected in an excellent manner, for in night-fight-

ing operations, success depends on this meeting and the officer had been specially trained to effect it.

The tactics of such an attack were a direct attack from the rear and from above, and the release, at the proper moment, of an accurately aimed burst of fire. The jet planes then merely continued on over the formation. As a rule, however, this could be done but once, for there was no enemy there for a second attack. If the enemy formation caught sight of the attackers first, it usually broke up immediately, and each plane attempted, by heading downward and giving the motor all the gas it would take, to escape. Such escapes, however, were rare, because a speed of 850 to 900 kilometers per hour was absolutely necessary, and this could rarely be reached or maintained by a plane driven by a piston motor. If weather conditions permitted concealment in clouds, this was the surest defense against jet planes, while the attempt to escape by heading downward nearly always failed.

Very soon, however, the fear of the jet planes was overcome by the Allied fliers and, on the German side, the astonishment was great that the quarry which had been thought sure, could, no longer, be attacked. This was accomplished by the Allies by means of a new and well thought out defense maneuver which, however, required strong nerves. When the jet plane had almost reached firing range the throttle was suddenly closed and the plane escaped in a sharp turn upward, or to the right or the left. The momentum resulting from their high velocities did not permit the jet planes to follow such sudden changes in direction. As a result of these tactics, the attack was warded off for the time being. A certain degree of surprise was maintained as a result of the fact that several jet planes flew in for the attack, spread out over a broad line with from 100 to 300 meters interval between them, depending on the breadth of the formation which was to be attacked.

The Allied pilots soon recovered their self-possession, especially after some of them had succeeded in bringing down an Me-262. This broke the spell. At first, the jet planes were brought down almost exclusively as they were taking off or landing. The early model jet plane in this situation (with its landing gear extended, speed low, motor operating at low efficiency) was extremely clumsy and unstable in flight. A surprise attack by Allied fighters, in such cases, frequently resulted in losses. After an increase in airdrome defenses had been effected by the use of 2-cm antiaircraft guns distributed for a long distance around the jet plane bases, these losses rapidly decreased, but the prestige of the jet plane had suffered a considerable blow. At first it was considered a hopeless situation when one encountered a jet-propelled plane under good weather conditions. But later, jet planes, climbing at from 550 to 600 kilometers per hour, were shot down in surprise attacks from the rear and above. Finally even jet plane pilots learned again to cast an occasional glance behind them. When a jet plane flew over a large formation, the pilot now had to count on a wild burst of fire directed from every plane in the formation behind him instead of, as formerly, the latter's disappearing as fast as possible. At the high speeds of the jet aircraft, deformations due to holes made by bullets or other projectiles can lead to very unpleasant flying conditions which may force the pilot either to bail out or at least throttle down his motor.

The employment of Me-163 rocket fighters was confined to cloudless weather conditions because, due to the short period for which they could remain in the air, a take off was considered only when a direct flight to the target was possible. Those rocket fighters which attacked the enemy formations from directly beneath, were,

at the most, able to get into position for one more attack after plunging upward through the formation, since the length of time for which their rockets would operate was extremely short.

Here, too, initial success was very good. But after only four or five brushes with the enemy, the enemy changed his defense tactics and was able to bring down a large proportion of the rocket fighters during landing. Hence, when the thrust of their motor had ceased, it was very advantageous to drop down in a steep plunge, so as not to fall easy prey to Allied planes driven by piston motors. The unusually great physical demands attending such attack methods could be borne for some length of time only by naturally qualified pilots.

During the last year of the war, the Allied Air Forces attacked Berlin with periodical regularity. In these attacks, night after night at exactly the same time, the target was visited in straight line flight without deceptive maneuvers or detour, and the Mosquito night bombers also made use of air mines. The German night fighters were powerless in the face of these attacks, which were carried out at cruising speeds of from 500 to 560 kilometers per hour, because the speed limit of the fighter aircraft available to the Germans possessed a maximum speed of 460 kilometers per hour (Me-110, Ju-88, Do-217, He-217). By way of experiment, therefore, a squadron of Me-262s (double-seaters) were stationed in the Magdeburg area, equipped with radar. These proved of excellent value in night interception. The Mosquito planes were approached on the same level and directly from the rear, and shot down from this position. No defense maneuvers could be noted on the part of the adversary, who at first was caught wholly by surprise. With the high cruising speed of his planes, he must have believed he had nothing to fear from night fighters. The time these fighters were in the air at night was limited to a maximum of an hour for safety purposes. This permitted only a small number of possible contacts with the enemy, yet it was not unusual for a single fighter to bring down three of four of the enemy's planes.

The attempt to discuss the tactics of the jet plane when pitted against another of its own kind, from the theoretical point of view only, would be hopeless, in my estimation, especially since the fighter plane, as a future weapon of aerial warfare, might perhaps no longer play a role of any consequence after the replacement of the bombing plane by the rocket projectile. It is possible in the future that the activities of the jet plane will be limited to day combat operations and reconnaissance flights, and that the increasingly prominent field of night combat flying, in the future as in the past, may be reserved for the plane powered by the piston motor.

The day combat tactics of the jet-propelled plane are influenced only by the physiologically limited abilities of the pilot. If the combat plane flies at a speed of 750 kilometers per hour at a height of from twenty to thirty meters, antiaircraft reaction will, it is true, be entirely avoided, but recognition or combat of targets, even with the best knowledge of the terrain, will hardly be possible. A flying altitude of eighty to 100 meters is, indeed, the minimum allowable for the discovery of a target, quite aside from the altitude necessary for effective fire against targets, with these planes.

U.S.—Canadian Defense

Digested by the MILITARY REVIEW from an article by Cyril Falls, in "The Illustrated London News" (Great Britain) 3 May 1947.

IN the summer of 1940 the President of the United States and the Prime Minister of Canada had a series of conversations at Ogdensburg, N.Y., and on 18 August, made a declaration that a Permanent Joint Board of Defense should be set up by the two countries. The Board was to study problems of sea, land and air, including personnel and material. It was to "consider in the broad sense the defense of the north half of the Western Hemisphere." It was to consist of four or five members from each country, most of whom were to be from the Services. The document did not lay down that the heads of the two sections should be civilians, though, in fact, they always have been. F. H. LaGuardia held that appointment on the American side, while the present Canadian representative is General A. G. L. McNaughton, but not in his capacity as a soldier. This was a remarkable and unusual organization to be set up in concert by two nations, one of them a belligerent, the other not. It met regularly, not in the capitals of the two countries—which were perhaps avoided as a gesture—but generally in New York or Montreal. The officers on both sides were of high seniority. They spoke their minds freely and were not afraid to disagree, but the work of coordinating the defense of North America was carried out with the minimum of friction.

The joint statements made in February 1947, were for the purpose of making known how far this cooperation of the years of war was to be maintained in time of peace. It was announced that it should be limited to the following features: (1) interchange of men to familiarize each country's defense establishment with that of the other; (2) cooperation and exchange of observers for exercises and tests of material of common interest; (3) encouragement of common designs and standards in arms, equipment, organization and training; (4) reciprocity in the availability of military, naval and air facilities in each country; (5) the underlying principle that the control of neither country over all activities within its territories should be in any way impaired.

The statements concluded by pointing out that these arrangements were made in continuation of the practice which had developed since the establishment of the Permanent Joint Board of Defense in 1940; that no treaty or contractual obligation had been entered into; that either country might at any time make an end of collaboration in respect of any or all of the points set out; and that neither country would take any action inconsistent with the Charter of the United Nations, which remained the corner-stone of the foreign policy of each.

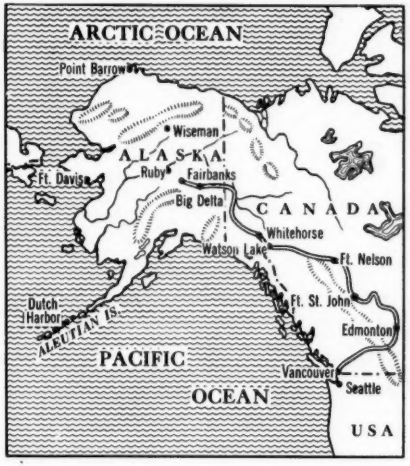
In elaboration of these formal statements, the Prime Minister said as regards the United Nations, that the Canadian Government held no obligations to the organization to be of overriding importance, but that much progress would be necessary before a system of international security could become effective; meanwhile, every nation must consider what steps it should take in order to defend itself against aggression. He pointed out that Canada had working agreements with the United Kingdom and other Commonwealth Nations for cooperation and exchange of personnel, and that these arrangements with the United States did not interfere with or replace the Commonwealth connections of Canada with regard to defense.

Finally, the Prime Minister spoke at some length on the subject of northern

defense, on which there has been a great deal of discussion. He made no secret of the fact that there was a strategic background to the new interest in the Arctic. In view of the technical advances of modern times, he said that the polar regions had become the shortest routes between North America and the principal centers of world population. Canadian defense, which had looked east and west —it has not had to look south since 1812 or shortly afterwards—must now also look north. Canadian defense forces must, therefore, acquire experience of the conditions of these regions.

On the other hand, he deprecated the sensational comment which has surrounded the subject and which was particularly prominent at the time of "Exercise Muskox." Long before the polar regions had assumed strategic significance the Canadian Army was responsible for their communications. It is now responsible also for the administration of the Northwest Highway System (formerly known as the Alaska Highway). The Royal Canadian Air Force has the task of taking aerial photographs for the production of maps and charts, and of administering the airfields of the Northwest Staging Route, used for civil aviation. The main work to be done in these regions of the far north is that of acquiring knowledge primarily topographical and meteorological, though there are also certain economic possibilities in them. The United States has been invited to take part in these investigations. Talk of an "Arctic Maginot Line" is absurd. Large forces do not attack or defend in such temperatures, so great defense works are not needed, and if they were they could not be constructed. A few aircraft might pass across what Mr. Mackenzie King described as "the shortest route"; a few landing places, with stores of fuel and food, might conceivably be established there by a hostile power. These matters have to be studied on the spot, as well as at the sitting of the Permanent Joint Board of Defense, but that does not imply vast military preparations in the polar regions.

It will be apparent that there is really nothing in the statements to shock Commonwealth or British susceptibilities. Perhaps there would have been less misunderstanding of their significance if a clause had been embodied in them to the effect that they did not interfere with or replace Canadian links with the Commonwealth, instead of that announcement being relegated to the Canadian Prime



Minister's subsequent explanation. A common view of the defense of North America is dictated to the United States and Canada by geography and strategy.

The immediate future will find Canada, with a small but well-equipped army, navy and air force, fronting both the Atlantic and the Pacific, and keeping a speculative and enquiring eye to the north. Strategically her situation is a strong one. She is well placed to meet any situation which may develop, though from the point of view of the defense of the Commonwealth as a whole there are certain defi-

ciencies which apply to the whole of this system. In virtue of her own arrangements and her understanding with the United States, her security is as well assured as it is possible in modern conditions. Her subsequent action must be left for the circumstances of the time, the general trend of events, and the appreciation of her government, supported by the views of her democratic electorate, to decide. It is most unlikely, judging by her past history and her action in the last two great wars that it will prove selfish, timid or niggardly. Those who demand more than this and seek to justify their claim by arguments based upon pure strategic theory, whether or not the theory is sound, are asking for the impossible. What is essential, if there is to be any solidarity on the subject, is that there should be frank and frequent interchange of ideas, of information, and of military doctrine. World politics and strategy are at present fluid, and it is more urgent to watch them in common and reach a common understanding of their significance than to enter into hard-and-fast agreements now.

It is foreseen in the statements of last February that there will be a tendency towards standardization of Canadian equipment, arms and training with those of the United States. That again is natural, if not inevitable. In 1940 Canadian war industry developed on British lines. In 1942 there had to be a considerable switch-over to American, and it is now felt that this process involved a good deal of wasted effort. On the other hand, the Canadian forces like those of the United Kingdom and most of the world, are now making use of the material already in their hands. Most of this is British rather than American in type. The introduction of new material can only be gradual. At the same time, it may be accepted that we in the United Kingdom, in cases where we have found American material preferable to our own, will adopt American designs for new construction and adapt our factories to produce it. Again, it must be realized, when considering Canadian cooperation in defense with the United States, that we, for our part, also invite a certain number of American officers to British military educational establishments and that the United States returns the compliment. The difference is that Canada is physically closer to the United States and has particular problems in common with her North American neighbor.

The Future of Mountain Troops

Translated and digested by the MILITARY REVIEW from an article by Major de Montjamont in "Revue de Defénse Nationale" (France) July 1947.

MODERN mountain troops will be increasingly used in the future. Not only is their inclusion in the army of tomorrow justified but also their development and organization into a mountain corps.

"Even on the basis of an unbridled atomic war," writes General de Lattre, "there remain missions which the atomic bomb will never remove from fighting forces, namely exploitation on the ground of its effects and the occupation of conquered terrain."

It is possible that no belligerent will dare, or be able, to use the atomic bomb. Or it is possible that only wars of limited extension such as tests of strength, questions of frontiers, occupation incidents, or colonial difficulties will occur. In no

wise, therefore, does the appearance of new weapons do away with the need for armies.

There has always been mountain fighting. There was mountain fighting even in World War II in which the leading role played by aviation and armor should not cause us to forget the more modest but occasionally important role played by mountain forces.

In Norway, the mountain brigade commanded by General Bethouard, composed of six battalions of Alpine *chasseurs* and one Legion battalion, continued to gain a more and more marked advantage over the enemy until it was recalled to France.

In the Alps on 10 June 1940, thirty-two Italian divisions attacked the six divisions still remaining in the army of the Alps. When the armistice came two weeks later, the Italians had nowhere pierced our defensive position and had approached it at only a few points. Moreover, it had been necessary, in the meantime, to face about to the north to meet the invading German forces and block them near Voreppe.

In Italy at the time of the Garigliano offensive, a mountain corps was formed to gain a foothold on Mount Petrella and outflank the enemy by way of the Aurunci mountains.

The Corps, composed of the 4th Moroccan Mountain Division and three detachments of Moroccan cavalry, was difficult to organize as all its units had previously to be reorganized with mules for transportation. Nevertheless, its action was decisive. The Germans, believing it impossible to move and supply large formations of forces over Mount Petrella, had almost withdrawn their forces from it. Their surprise was complete when the French successfully engaged nearly 35,000 men and 7,500 animals in this mountainous and almost trackless sector. In this operation, the exploitation effected by breaking into the interior of the enemy position and making use of the special mobility of mountain forces in difficult terrain, was a complete success.

In the Caucasus, the Germans sent mountain battalions into action recruited especially from former mountain guides, mountaineers and members of Alpine clubs. These units, trained to live and fight at an average altitude of 3,000 meters, pushed hardily ahead and seized possession of dominant heights and passes.

During the winter of 1944-1945, it may be said that a good part of the French Army was fighting in mountains.

In the Vosges, cold and snow gave the majority of actions the character of mountain operations, and many of the units suffered from a lack of proper equipment. In January 1945, the commander of the 1st Army made an urgent call for reconnaissance forces operating on skis.

On the Alps frontier during the winter, the 27th Alpine Division held its own against the *Gebirgsjäger* of the German 5th and 157th Divisions, constituting a threat to the rear of the German front in Italy. A typical encounter was that above Chamonix in which seventeen ski troops decimated seventy German infantrymen in seven hours of spirited action in the glacial wastes at an altitude of 3,600 meters in the highest battle of the war.

In March and April of 1945, the Army of the Alps passed over to the offensive, first in Tarentaise, in the direction of the Little Saint-Bernard, then in Maurienne, in the direction of Mount Cenis; and finally in the Maritime Alps where the Free French Division seized the Authion massif.

These last operations were generally characterized by high altitude and increased employment of specialists. Thus, on Mount Cenis, the ski battalion of the 7th Regiment of Rifle Troops fought at a mean altitude of 3,000 meters.

In addition, mountainous areas were the favorite terrain of the "maquis," whose liquidation could often be assigned only

to mountain troops. In July 1944, two German mountain divisions, in spite of reinforcement by aviation and paratroops, failed to reduce completely the resistance of the Vercors.

The possibility of mountain operations in the future continues, and this indicates that the units that will conduct them, must have increasingly advanced technical training.

Armies may undergo many changes. With development of new weapons, they may find themselves faced with unexpected difficulties that may considerably alter their action.

The first and most important of these changes may be the vast changes in the terrain. Formidable increases in fire power may lay waste vast stretches over which communications could not be maintained. Armies would then be faced with the dilemna of having to cross over the overturned area or to go around it. The latter would require them to cross mountainous areas, forests, marshy areas, etc. Under such circumstances, normal units bound to the roads would either be blocked or considerably retarded while roads for vehicles were constructed. In such event, troops accustomed to carrying or packing their own weapons, equipment and supplies would become invaluable. During World War II, German mountain troops were successfully engaged in the great Russian forests, in the Pripet marshes or in areas which had been the scene of extensive demolitions.

The second difficulty lies in the possible extension of theaters of operation to polar regions. Normal units, even though well equipped, would operate under heavy handicaps there, due to cold and snow. Trained mountain troops, on the other hand, would handle the situation infinitely better.

A third difficulty would be the crossing of a radio-active area which also had been overturned by an atomic bomb. It would be the task of mountain troops, or others charged with crossing such zones to determine the proper means of protection.

Thus, in addition to the normal operations in mountains, mountain troops may be called on to operate in other terrain, or in exceptionally difficult climates.

The conditions under which mountain troops will be able to fulfill these new missions involve personnel, and material means.

First, exceptionally difficult missions require exceptionally robust personnel. In a battalion of mountain troops on occupation duty in Austria, seventy-four out of 313 recruits were rated by the psychological services as unsuited for infantry combat. Common sense would dictate that the future mountain soldier should be selected from among the most robust young men and the more so especially if he is to be given difficult missions. And this physical vigor must be characteristic of not only riflemen, but also of mountain artillerymen, engineers, and medical men.

In common with paratroop units, mountain units of all arms should be elite units, meeting high physical and moral requirements, and subject to severe age limitations or periodical tests.

In addition, this selected personnel should be provided with adequate material means. The tactical mobility of the present mountain units is already great. But as they move farther from their bases, the number of pack animals or porters required for supply becomes rapidly prohibitive. Their artillery is either archaic, like the mountain 75-mm or bound to the roads like the 105-mm howitzer.

The execution of the missions of mountain troops will require the employment of means that are already known but still unemployed.

The difficulties experienced with ammunition supply lead to the principle of fewer arms and more ammunition. All small caliber weapons should use the same ammunition. For the same reason, the

61-mm mortar should be replaced by the 81-mm mortar.

Similar simplifications would help solve the problem of supplies, especially when these must be dropped by parachute, which must become the normal method of supply. The dropping of supplies by parachute, becomes more difficult in the mountains, because of frequent bad weather. In spite of this, however, supplies were frequently and successfully dropped in the Alps during the winter campaign of 1944-1945, and recently in Austria.

A good method of supply or evacuation in mountains is by cable lines. With four cable lines, the Germans supplied the high defile of Mysty in the Caucasus at 3,100 meters altitude with daily loads of four to five tons. Cables made up of strands of nylon, twenty times lighter and twenty times stronger than metallic cables, would increase still more the possibilities of a rapidly installed field cable line with which every mountain unit should be provided.

The autogyro and the helicopter are now in common use. In the modern employment of mountain troops, they will likely play a leading role owing to the many missions for which they are adapted. The French helicopter SE-3.000, for example, is able to carry four passengers or loads of as much as 1,000 kilograms, either on board or suspended by a cable. With sufficient air protection, it is possible to carry heavy weapons to the point of main effort, move a mountain gun from one position to another, aid in supply, provide command liaison or handle medical evacuations. The Germans were well aware of these possibilities and planned to provide each mountain division with three helicopters.

Lastly the present inadequacy of mountain artillery can be remedied. By strafing and bombing, aviation is able to effect neutralization on request. Recoilless weapons can import to mountain troops the fire power they now lack. Thus, the 75-mm American gun, M-20, which weighs fifty kilograms, can be carried and served by two men, and fires a 6.3 kilogram projectile more than 6,000 meters.

With these changes, mountain units will be able to advance with assault packs and an initial allotment of supplies carried on pack animals. They will be capable of moving over terrain (mountainous or level) entirely devoid of communication routes, and supplied by means of a combined system of pack-animal columns, parachutings or cable lines.

The same methods may be developed in polar areas. Here, in addition to aircraft of all types, we may also employ dogs and sleds. Also, there are problems relative to equipment and armament that are still far from being solved. The recent American maneuvers in Alaska appear to prove that, at temperatures fifty degrees below zero, no operations are possible, and that the oil employed with weapons solidifies. The Himalayan expeditions, both French and foreign, can also be sources of fruitful information.

It is not intended that motor transportation should be abandoned. If it were, mountain units would lose all strategic mobility. It is important that such units be rapidly transported to the place where they are to operate, or from one theater of operations to the other.

Practically all mountain units should be capable of being transported by truck or plane. Since all their equipment is capable of being taken apart and carried on the backs of men or in pack saddles, the mountain unit is one of the lightest of all. Organically it possesses no horse-drawn vehicles, only light, all-terrain trucks that can be transported by air. These must be designed for travelling over mountain roads and in mud and snow. A good model tried out in Austria is made up of a Jeep whose chassis is extended rearward and provided with a third load-

carrying axle. Such a vehicle carries six men seated, or 500 kilograms.

It appears, therefore that mountain forces are not outmoded, but will occupy an important position in the army of tomorrow. But isolated units will not be effective. That is why this study leads logically to the conception of a "mountain corps."

As we have seen, a mountain corps existed at one time in Italy, but it was only temporary and created solely for certain operations. There are many reasons for it today.

First, more than half the frontiers of France are mountainous. It seems logical, then, that a considerable part of the army should be stationed in the mountains and engaged in the study of mountain warfare.

Second, France is the only Alpine nation able to pursue a course of mountain training. Switzerland is neutral, Austria and Italy are temporarily out of the running, and Germany is disarmed. Would it not be fitting, therefore, to place at the disposal of the United Nations not only units of great material strength, which we should have difficulty in maintaining, but high quality units which were specialists in a form of warfare in which we should be able to excel? Of the three military sections of a modern army—airborne, armored and mountain—the third is financially the easiest of realization.

From the moral and patriotic point of view, mountain training produces most salutary effects. In physical and moral developments, and the creation of stamina, discipline and team spirit, its lessons penetrate deeply. The relative independence of small units in the mountains quickly gives cadres a sense of responsibility and leadership.

High mountains in winter are a testing-ground of the first order for men, weapons and equipment. Officers and men, trained to live and fight in the mountains and to overcome technical difficulties, may be engaged anywhere. Whatever be the form of a future war, continuous and systematic training in mountain warfare will always be of value.

Lastly, the tactical aspects of mountain warfare, or of war under difficult conditions, is of great current interest and mountain troops seem to be the best prepared for operations under such conditions. This tactical aspect is modified by the possibilities of modern means. But the employment of these means should be studied, tested and employed by specialists. There already appears a certain resemblance between mountain troops and paratroop units in missions, armament, equipment, and even training.

These new perspectives renew interest in mountain troops, and their organization, development and training should be given increased attention. Formation of a mountain corps would permit training under rough and healthy conditions, and impart a morale similar to that of the armored or airborne formations. In addition, this corps could become an elite organization, equally fitted for action in high mountains or particularly difficult conditions of climate and terrain.

It would indeed be illusory to assume that peace-time training and education will produce heroes of pure quality; but it is possible, by means of severe discipline and very careful individual training and education, to prevent the man from abandoning completely, in the difficult moments of the battle, the things that were implanted in him in time of peace.

A Defesa Nacional (Brazil)

Russian Artillery—1941-1945

Digested by the MILITARY REVIEW from an article by Lieutenant Colonel H. G. de Watteville in "The Journal of the Royal Artillery" (Great Britain) April 1947.

THE scarcity of information concerning the organization and work of the Russian Artillery during the recent German-Soviet War is to be regretted, since much that occurred during this conflict must prove of high interest.

For the previous two centuries the Artillery Service had been the pride of the Russian Army. Its complete failure in the war of 1914-17 had come as a shock to Russian soldiers. It could, however, mainly be attributed to the faulty system of supplying both material and ammunition to the troops, not only during but long before that war; it could not discredit the human material.

Still, after the Bolshevik Revolution of 1917, no effectual steps appear to have been taken to restore the Russian Artillery until, in 1937, General Nikolai Voronov was appointed head of the Artillery Service. This forceful character, then thirty-eight years of age, forthwith set about re-educating the Russian gunners. His belief in the cannon as the main element of strength of the Red Army was profound; his energy was unbounded.

By 1939 Marshal Voroshilov, then Commissar for Defense, could report that the fire-power of the Russian Artillery had been trebled. This statement was not far from the truth, though its further implications appear to have escaped all military critics at the time. This circumstance arose from the fact that the Germans in their frenzied haste to re-arm and to create a "New Model" army had neglected their artillery arm. The doctrine had been evolved that artillery had lost much of its significance, so German military authorities devoted themselves whole-heartedly to the development of their "flying cannon," i.e., the dive-bombers to work with large, fast-moving, tank formations, while they pinned their faith to the trench-mortar as the supporting weapon of infantry. But Voronov, while increasing the actual number of cannon to be manned by his gunners had also made every effort to improve their mobility; and this fact was incorrectly appraised abroad—at least by German critics. The *Wehrmacht* in 1941 was certainly lacking in artillery power.

Meanwhile, Marshal Voronov had proved true to type. In conjunction with General Viktor Tikonov, during the Soviet-Japanese "small war" of 1938 in Manchuria, he evolved methods of artillery fire which were a prelude to the developments of 1942-43. These experiments were continued in Finland during early 1940 when Voronov broke through the Mannerheim Line by means of massed fire. So in the end both future belligerents had evolved, by starting from somewhat similar reasoning, a somewhat dissimilar doctrine. The Germans had been influenced by the experiences gained during the Spanish Civil War where the power of the artillery never predominated. The Red Army on the other hand, had defeated first the Japanese and then the Finns largely by means of their batteries. Yet both parties had this much in common: each sought to find a "center of gravity" in the enemy's front against which there could be brought to bear an overwhelming volume of fighting power. But the German planned to obtain such a result by tank and dive-bomber—and he did obtain what he wanted in 1939-40—while the Russians relied more upon a slower development of fire-power and upon cannon. The opening phase of war in 1941 thus found two opposing theories of armament at grips.

It is not yet perfectly clear what actually took place during those early months of the war, but it is at least possible that

the Germans suddenly became aware that their army was deficient in artillery. Hence the frantic search throughout occupied European arsenals during the winter of 1941-42 for every type of cannon and howitzer that could be dispatched to the east where the excellent and numerous German trench-mortars were being held at arm's length by the superior Russian cannon.

The Russians, on their side, lacked trench-mortars. Consequently Voronov created a special supply branch for the production of these weapons and their ammunition. Nevertheless, as fast as the Germans began to bring up batteries equipped with Finnish, Belgian, Hungarian, Dutch, French, Czech and Rumanian weapons, so the Russians became more and more hard pressed to produce reinforcing units of medium and heavy guns to counter this new artillery. The result was that there set in a race between the two belligerents in the matter of producing artillery matériel. The Russians in the end outstripped their rivals; but during the winter of 1941-42—in fact until the first Russian counteroffensive conducted around Stalingrad in the winter of 1942-43—superiority in artillery power hung in the balance. It was during this year that the provision of war material to Russia by the Allies might be regarded as having proved of the greatest assistance to the Red Army.

Whatever the effect of Russian fire in the field may have been, it depended throughout the war very largely on a lavish supply of ammunition, which in turn depended on the vast transport which the Russians managed to place in the hands of the artillery supply services. The arrival of trucks from the US in 1942-43 may, therefore, have proved a distinct factor in the attainment of the later great Russian successes. The vast space over which the war raged caused this question of ammunition supply to become the true crux of the whole Russian Artillery problem. It was in this respect that Voronov's direction was so important. He never for one moment lost sight of the need for a lavish supply of ammunition, while never sacrificing the mobility either of guns or of artillery transport. Such were the twin foundations on which he evolved his fire tactics.

The first occasion on which Voronov could bring any concentration of fire against the Germans was before Moscow at the end of 1941. But his resources were still so limited that these attempts could not achieve anything very considerable; they could only be regarded as puny efforts compared with what was to come from 1943 onwards. Nevertheless, during 1942, by withdrawing one artillery regiment from every infantry division of the Red Army, Voronov managed to create a considerable mobile artillery reserve which in the theory of its application was not far removed from Senarmont's artillery reserve, as employed by Napoleon at Friedland and Wagram over 130 years earlier.

The first occasion on which Voronov could employ this new artillery reserve was before Stalingrad. On 19 November 1942, the first great Soviet counteroffensive was launched to the north and south of Stalingrad; 5,000 pieces composing Voronov's reserve were sent into action almost with one stroke; on one single day they fired about 700,000 rounds. The next ten weeks of fighting proved the value of Voronov's theory, tactics and organization in a planned offensive. It still remained to be seen how his conclusions would conform to defensive action. When in July 1943 the Germans launched their final offensive effort against the huge Russian salient at Kursk, they attacked simultaneously from north and south with every tank and gun they could muster. The fighting and the casualties were, porportionately of course, perhaps the heaviest known in the war. In the end the Russian

gunners defeated the German assaults—completely in the north of the salient, while they could admit only a partial lack of success to the south, where they had to withdraw some thirty miles. Voronov's triumph was complete.

From that moment the Russian Artillery swept all before it. Powerfully assisted by the new Russian Air Force, it went on from success to success. The new Russian airplanes came into action to assist the batteries just as fast as production began to falter in Germany. It became clear that German casualties in men and material could never recover from the terrific losses of 1941-1943.

Organization and Tactics

As a general rule it would appear that the ever-increasing artillery regiments were raised and armed as required according to tactical needs. As all such units and formations were numbered consecutively on a general list, large or small blocks of like units were being inserted in sequence on the list without much reference to the nature of their neighboring units. Towards the latter part of the war the Russians concentrated on the constitution of new antitank and self-propelled units: this is all probably fact and more than guesswork.

Deductions concerning organization are the following:

(1) There exists no doubt that the Russians organized and employed in the field whole artillery divisions and even corps. These were used as independent formations for tactical purposes and were handled in the field in a manner approximating infantry divisions.

(2) In all press reports the repeated reference to Russian artillery firing over open sights as though this were a very usual proceeding seems to point to a regular practice of thrusting forward the guns to point blank range.

(3) The mention of artillery units and sub-units playing a leading role in street fighting during the capture of fortified towns would show a very bold handling of the guns, and their close connection with infantry.

The employment of independent mobile artillery formations combined with the practice of firing over open sights appears to lie at the root of one of the most interesting developments of the war. Such a use of batteries and artillery formations for the mobile close support of the assault has been criticized by many authorities as being necessitated by the lack of any highly developed system of communications, as well as by the absence of adequately trained personnel to man such a system in the Red Army. Russian artillery technique is said to have been not very highly developed. Hence the desire for the simplest methods. These are views which may be true, yet it is possible to qualify them with the fact that this short-range use of guns seemed congenial to the Russian mind and that the Russians never shrank from hazarding losses in men and material which an Anglo-American commander would have hesitated to incur.

These characteristic Russian attacks were rendered possible because the Russian quantitative superiority in guns and ammunition was assured and growing from the end of 1942 onwards. During the Stalingrad campaign (1942-43) the Russian guns employed in such concentrations of fire are reported to have numbered one per four yards. One year later, during operations west of Kiev, their number had risen to one to three yards. Finally in the spring of 1944, on the Karelian Isthmus, there were said to be assembled one gun per two yards. The Russian claim that these artillery masses have risen since World War I from 60-100 to 200-250 guns per kilometer. They declare that they actually used as many as 350 pieces per kilometer. They could well afford casualties; they possessed ample ammunition; and

they worked accordingly. There can be no question that the policy paid.

In resisting tank attacks, again, the artillery and infantry worked in close contact. The Russian object was, primarly to break the tank assault by gunfire before it could reach the infantry of the defense. Should this process fail, or should it not seem feasible, they would attempt to lure the German tanks into what they termed a "fire-bag," i.e. to draw them on, then encircle and eventually destroy them by close range fire. For this purpose they always planned to keep an artillery reserve in hand. Artillery was declared by Voronov himself to be the chief weapon against the tank.

A word might be added as to the combination of artillery with cavalry, for the Russians made extensive use of their numerous Cossack divisions, particularly during the months of mud. No squadron acting independently would be left without any hope of artillery support. For this purpose the horse-drawn batteries would be decentralized while antitank guns were also added to all small forces. But the artillery divisional commander would always retain a mobile artillery reserve for instant and decisive use. In this connection self-propelled guns came much into fashion.

In order to insure surprise, the handling of the Russian guns might be considered to be bold in the extreme. To quote one instance: in December 1943, during Vatutin's attempts made with the 1st Ukranian Group to regain the great Zhitomir road to the west of Kiev, his batteries first began to conduct a normal creeping barrage. But time was urgent so the guns were suddenly pushed forward to point blank range when they rapidly smothered the enemy's positions. It was owing to this audacity that these forceful artillery tactics induced a great extension in the use of the self-propelled gun. The speed, the head-on armor and the readiness for action which were developed in this type of weapon were found effective, and this circumstance led to a rapid increase in the numbers of self-propelled units. In fact the self-propelled gun seems finally to have entered largely into the organization not only of the normal artillery division but also of the tank formation. The heavier types of self-propelled weapons might be moved by rail to within sixty miles of their fighting destination which they might then reach in about three more hours. The guns fired, as a rule, over open sights and engaged visible targets.

When acting with tank formations the role of the self-propelled artillery reserve was considered highly important since these weapons were intended to relieve the tanks of all tasks leading to a "direct" engagement. The object was to enable the tanks to recover their facility for maneuver, or to carry out flank attacks. For such purposes, the self-propelled units would either go forward at speed to engage the enemy in front of the forward tanks, or they could hang back so as to prepare an ambush—all according to the nature of the terrain. For purposes of surprise to be obtained from ambush positions the Russians claim that this class of gun is unrivaled.

Again there is no reason for doubt that the Russian Artillery, in common with the other arms, was organized into two distinct seasonal armies for summer and winter work respectively. The former was equipped as would be the case in any normal Western European army; but the latter was clothed in white; guns, tanks and transport were painted white; track on vehicles was made especially broad; ground clearance was increased; wheeled vehicles were supplied with skis in front; six wheelers would be fitted with some sort of tracks for the driving wheels and so forth. Most characteristic was the provision of air-screw propelled sleighs for cross-country work over snow. In between

the two seasons "intermediate" formations could be introduced to cope with the mud and floods of spring or of autumn. Such formations consisted largely of horse Cossack divisions, still accompanied with horse artillery.

Too little information is available to say much more on the organization of the Red Army into such two seasonal relays. It is highly possible that the same infantry personnel could be clothed and equipped appropriately for either season. But there is nothing improbable in accepting as correct the assumption that the Russians maintained at least two cadres of troops equipped with some armament and transport that must have been radically dissimilar.

Lastly during the Russian advance to the Dnieper in the autumn of 1943, they are reported to have worked in three distinct echelons so as to maintain their pursuit, moving at full pressure. These three echelons were presumably organized so as to maintain a fighting front, supported at an interval of perhaps twenty miles by the second echelon. The third echelon might almost be regarded as resting; how far and when it advanced is not at all clear. The interesting fact from the artillery point of view is that when the first echelon was relieved by the second echelon, it turned the whole of its guns and wagons over to the new-comers as they came up. The latter would bring up repaired weapons and a few replacements to make good the wastage in the front line equipment. Then the first echelon stood its ground until it had fallen back to third rank. Further it would seem as though all lesser repairs would be carried out by the second echelon before coming up, but that wholesale replacement and major repairs would be carried out by or with the third echelon. The course of events during 1943 and early 1944 makes some plan and method of work of this nature appear more than probable, although for the last campaign in White Russia (June 1944) it may have been abandoned in order to arrive at a heavier concentration of troops for the final assault on Berlin.

Matériel

Super-long range and extreme high velocity weapons were not favored by Soviet artillery designers. The maximum ranges at which the Russian artillery fired varied from ten to fifteen miles. Conversely the Russian designers did their utmost to obtain accuracy and fire-effect by adopting lower muzzle velocities and increasing the size and power of the bursting charge. The results of such a policy became clear when the Russians set about smashing the strongest German defenses around Leningrad and Vitebsk. At the same time the mobility of all ordnance to be used in the field remained of paramount importance.

The principal novelties evolved by the Russians during the war itself were in the nature of trench-mortar and light support weapons—the six-barrelled mortar, nicknamed "Stalin's barrel-organ," as well as others of 2-, 3- and 5-inch calibers. A certain 1.8 light cannon was declared the lightest weapon of its power ever constructed. Finally there was introduced a "rocket projectile" fired from a remarkable gun popularly known as "Katyusha." It is believed to have been laid and operated by electricity.

Of the heavier types of Russian ordnance nothing worthy of notice has appeared in the press; neither have any illustrations been allowed to be published which throw much light thereon.

It appears that three main types of self-propelled guns were built—a light gun for work in conjunction with infantry; medium and heavier ordnance for tasks of a self-evident nature. The heaviest self-propelled gun was a six-inch piece of four tons weight mounted on a special heavy

tank chassis: it had head-on armor only. Lighter self-propelled guns, it is possible, had light all-round and overhead armor, being little short of modified tanks.

The quality of the various Russian pieces is generally spoken of as being good; it was certainly at least adequate. In the earlier stages of the war Russia ordnance captured by the Germans had been said to have been somewhat hurriedly finished, so much so that in certain cases they might even be hazardous to handle. But owing to the all-prevading mud of spring and autumn this defect might permit the weapons to continue working whereas the more accurately and highly finished German products would jam and become ineffective.

General Conclusions

In drawing any deductions, it would be wise to bear in mind some of the general conditions which affected this stupendous struggle. Miscalculations as to the influence of such factors affected the German logistics of the war to such an extent that they may be said to be at the root of the German failure.

First, the scale of the area and the distance over which the operations ranged and the transport worked.

Second, the diversity of climate prevalent in Western Russia which profoundly affected strategy and equipment.

Third, the enormous man-power reserve possessed by the Soviet Union. The Union's peoples offered some 180,000,000 inhabitants to draw upon for troops as against some 80,000,000 of Germanic race.

Fourth, the immense and distant dispersion of Russian sources of raw materials and war factories which places a great proportion of Russia's war industries out of reach of aerial or ground attack.

With such advantages, not to mention the steady influx of Allied war material and the all-important results achieved by the Allied Air Force, the Red Army could afford to indulge in far more venturesome tactics than the Germans.

Accordingly, the Red Army's policy of employing artillery in large independent formations and of handling the guns almost as though they were wholly mobile tactical units and formations becomes comprehensible, even if allowance be made for any obligatory recourse to the simplest methods of fire and of communications. Moreover with two differently equipped types of units—for summer and winter use—there always existed the possibility of finding a valuable reserve in case of accident. Again the large superiority of manpower enjoyed by the Red Army would permit an advance in three distinct echelons from the latter part of 1943 until near the end. The Russian Armies were able to rely on the heaviest and speediest artillery preparation to be followed by the advance of numerous mixed columns of tanks, infantry and artillery and aircraft.

Here we find a tendency towards a tactical fusion among the various arms. The fact that such Russian mixed forces do not appear to have ever exceeded—possibly—one division in strength need occasion no surprise since the command and control of any such force might constitute a ticklish matter.

The reduction of the German field-fortresses and "hedgehogs," was surely a demonstration that sheer artillery power, followed by the bold movement of the guns to keep in step with an infantry advance, can be made highly lucrative. But such movement will be rendered possible only by the possession of great artillery superiority, this being of high mobility, and by a lavish expenditure of ammunition. So we return once more to the basic problems of the supply of ammunition and of fuel. Figures would imply one transport worked for every ten to twenty-five front-line combatants. It might well be that the success of the Russian guns depended on the work achieved by their transport.

Air Power and Strategy

Digested by the MILITARY REVIEW from an article by Air Vice-Marshal E. J. Kingston-McCloughry in "The Royal Air Force Quarterly" (Great Britain) June 1947.

THE aim in war is to destroy the enemy's will or ability to make war. Before the rise of air power, warring nations were unable to adopt direct means to achieve this aim because the source of the enemy's war power was inaccessible until the barriers which protected it were overcome.

Thus, a maritime nation like Great Britain operated a navy to secure its maritime communications, not only as the prerequisite for safekeeping its war portential but also for launching and maintaining a land offensive. The complementary role of the navy was to strangle the enemy's maritime communications so as to weaken his home front, thereby easing the task of the army which was to overcome the inner barrier presented by the enemy ground defenses, and ultimately to reach the enemy's vitals.

The army—the instrument which was employed to overcome the inner barrier—was thus the most direct offensive force which could be brought to bear upon an enemy, but this force could not achieve its ultimate aim without being committed first to the preliminary task of overcoming the enemy army.

The advent of the airplane made it possible, for the first time, to engage directly targets at distances far beyond the range of other weapons. The new weapon was also highly flexible in that it could be switched from one target system to another rapidly and easily and thus could concentrate a crushing weight of bombardment at the selected time and place. The characteristics of long-range and flexibility combined with accuracy—an accuracy which scientific devices will continue greatly to increase—demand that the operations of air forces should conform to a different strategy from that of armies, whose function as the prime offensive instrument of war they have inevitably to assume for the future. Since aircraft can attack and destroy vital targets in the rear of the enemy's surface forces, the relative importance of disorganizing those surface forces is greatly reduced. Air Forces, in other words, can strive directly towards the achievement of the aim which an army has had to pursue by steps.

The operations of air forces have, in fact, a two-fold effect; they weaken or destroy the enemy's will or ability to wage war by their impact on his vital centers of government, war economy and war administration, and at the same time they assist the operations of surface forces by disrupting the command and communications of the enemy forces.

The importance of these basic functions of air forces, which derive directly from their prime characteristics, should not be overshadowed by too much attention to certain secondary functions. Besides reconnaissance, these secondary functions include offensive action against the enemy's sea and land forces in support of our own; and the defensive battle to destroy the enemy air forces, both on the ground and in the air. From this defensive use of air forces is derived the conception of "air superiority" which confers upon its possessor the requisite freedom from air attack indispensable for sustained and successful offense by all armed forces, both air and surface. Aircraft are also important agents in military, as well as civil transportation. Functions such as these are important and must be fully exploited, but it is necessary to rule them out of consideration while eliciting the changes which the rise of air power has brought about in the evolution of grand strategy.

As the characteristic which exercises the most powerful influence upon our conceptions of grand strategy is the potentiality of air forces as agents of long-range strategical bombardment, it is on this potentiality and its future trend that our attention should be focused. World War II produced two revolutionary developments in the field of strategical bombardment. The first of these was the development of long-range pilotless aircraft and long-range rocket projectiles. The second was the development of the atomic bomb. The former provided a new and unconventional method for the delivery of a conventional explosive. The latter provided, for carriage in conventional bomber aircraft, a new and unconventional weapon of immense destructive potency. It is conceivable that future joint development along these lines may eventually supersede our current technique altogether, so that, in the history of warfare, bomber aircraft may appear merely as a transitional phenomenon in the evolution of longe-range bombardment. Since, however, the strategic function of all devices for long-range bombardment is identical, it is important, during this process of evolution, that the development of new longe-range weapons and techniques should be pursued jointly with the operational development of the current bomber aircraft which at present constitute the prime agent of destruction at long and even medium ranges.

From the fact that air forces are at present the most directly effective and economical agents for operating against the enemy's will or ability to wage war, it follows that the employment of air forces and associated instruments of long-range bombardment to the best advantage must be the prime consideration in the grand strategy of the armed forces as a whole. We can no longer think of warfare as consisting primarily of land campaigns supported by sea and air forces. All campaigns against the enemy's war will or ability must now be prosecuted by the most powerful combination of our armed forces. The primary objective is the very heart of the enemy's war power; his armed forces are secondary. Thus the primary instrument of war today is the long-range bombardment force; the navy and the army are essential partners.

In short, the technique of strategical bombardment has already introduced into warfare a force so novel in range and striking power that the pre-suppositions of strategy are of necessity profoundly modified. The extent of these modifications could not be realized from the small-scale air operations during World War I. Even in World War II there were strong indications that their full extent had not yet been appreciated by the majority of military thinkers. Any gulf of this sort between strategical theory and the realities of modern warfare is pregnant with danger so it behooves us to insure, in so far as we are able, that the strategy with which Great Britain prepared for future wars is a strategy based upon present realities brought about by the rise and devastating power of longe-range bombardment.

Acceptance of this new conception of the inter-relation of the roles of the three fighting services has important implications for their reorganization in peacetime. The share of the Commonwealth's resources which is to be devoted to each of the three services must obviously be influenced by their relative ability to bring victory rapidly and economically. The task of assessing these shares and of developing and training the three services for their respective roles must be performed by an authority which surveys the whole war effort and which is in a position to regard the three services as a single national instrument.